



SATURDAY, OCTOBER 4, 1873.

Electric Railroad Signals at Vienna.

Mr. Robert James Manos, M. D., reporter for the "Society of Arts" at the Vienna Exhibition, describes as follows three electric signal systems exhibited at Vienna, all by Englishmen:

Mr. Preece has sent to the Exhibition a complete set of the apparatus (4,866) he employs for the "block" system of railway signaling on the Southwestern line. The fundamental principle in this system is that trains on the same line are to be kept apart by a certain and unvariable interval of space, instead of by an uncertain and unreliable interval of time. In Mr. Preece's method the signal which opens any "blocked" section of line is made by the signalman at the advanced end where the section has to be cleared, and no signal is held to be effective and complete until it has been acknowledged by the receiver, and "repeated" back to the sender. Mr. Preece also lays great stress upon the fact that the miniature apparatus which he employs in the signalman's room, and which is the apparatus that is shown in the Exhibition, shall all have identically the same form as the instruments used for displaying the effective signals on the line. The switch in both instances is worked by the same movement of the arm. In both instances the horizontal red arm on the signal-post means the same thing. A strong and uniform association is thus established in the mind of the signalman, which becomes almost an instinct, and is never confused or disturbed in moments of emergency. It is also an important part of the arrangements that the horizontal or "danger" position of the semaphore arm is maintained by gravity, and it is the dropping of the arm that is brought about by electrical action. If any accident occurs to the electric wires, so that the transmission of the currents is arrested, all that can happen is that the danger signal remains resolutely and obstinately displayed, and that all traffic is for the time suspended. The effective parts in the instruments are of extreme simplicity. In every instance, excepting one, the movement is effected by converting a coil of soft iron into a magnet when an electric current is sent through a surrounding coil. The semaphore arm is dropped by an induced magnet pulling up its weighted end. The bell is rung by an electro-magnet acting on the vertical elastic rod of its hammer. The semaphore sends back a "repetition" signal for itself to the station from which it is worked, to show how its arm is placed; and it does this by turning on a current from one of other of two distinct batteries by their negative or positive pole as required. The current, as it rings the bell, acts on a permanent magnet, hung between the poles of the electro-magnet, so that the magnet is drawn to the right or to the left as the "danger" or "all clear" signal is to be recorded. The best method of working the system requires three wires between the stations; one wire to connect the bells and repetition signals of both stations, a second to connect the switch of one with the semaphore of the other, and a third to connect the semaphore of that station with the switch of the other. The advantage of this is that the currents which effect the signals are maintained so long as they have to be displayed, and lightning, electric clouds and earth currents are powerless to produce derangement. Each signal station, unless it is a terminal one, needs a double set of the four instruments; namely, bell-key, bell and repetition signal, switch and semaphore post. By a differently arranged apparatus one wire can be made to work all the signals; but the current is then a momentary and interrupted one, and other expedients have to be brought into play for obviating the occurrence of disturbance from lightning or earth currents. The bell key turns on its electric current by pressing the end of a flat spring, which forms one pole of the battery, into contact with a metallic pin or standard in communication with the other pole—the switch accomplishes the same thing when lying across a brass arc in one direction, but not when it is thrown fully back the other way. The brass arc, a little above the pivot of the switch handle, it will be observed, is cut through. The pivot is in communication with one pole of the battery, one-half of the interrupted arc with the other pole, and the other half with the earth. The three binding screws of the switch accomplish these three different communications. The largest semaphore instrument shown by Mr. Preece is an apparatus contrived to warn a signalman when a signal lamp that is out of the range of direct observation is extinguished. A brass arc is placed above the flame of the lamp is expanded, and pushes up an elastic bar, so as to "break contact" and interrupt an electric current; when the lamp goes out, the arc cools and contracts, the bar settles back and renews contact, and an electric current is turned on to the signal room, to make a temporary magnet there pull over an index so as to show "light out" on the face of the instrument.

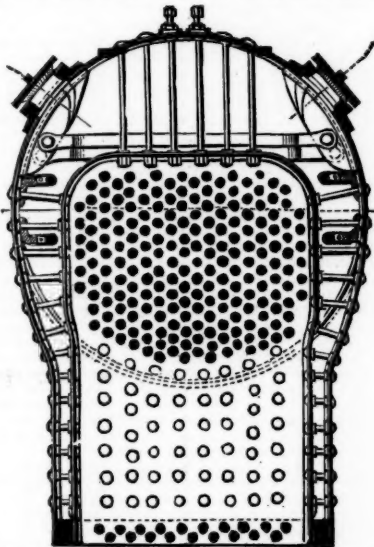
Mr. Harley, of Barnsbury, proposes to work the "block system" of railway signaling by a single wire that shall have complete immunity from disturbance from lightning, electric clouds, or earth currents, and the apparatus which he employs, and which is shown by him in the Exhibition (4,842) is of an altogether novel construction in one particular. The needle which swings vertically on the dial is not a magnet. It is a pointer of soft iron, suspended upon a center pivot, carrying horizontally beneath the pivot a flat soft iron ring. The ring hangs a little way beneath the pivot by a rigid connection, and when horizontal keeps the pointer vertical by its own weight. A permanent horse-shoe magnet above directs its poles towards the flat edges of the ring, and at the same time, the ring is invested by the coils of an electric current conveying wire. When no current is traversing the coil the flat ring keeps horizontal, because it is pulled up equally both ways by the poles of the magnet, and is held back equally by its rigid attachment to the pivot. But when a current traverses the coil the flat ring becomes temporarily an induced magnet, and is pulled up on one side and pushed down on the other by the opposite poles of the permanent magnet, and the pointer, at the same time, is consequently moved on the dial in the same direction. The signalman who sends a signal can turn on either a positive or a negative current by using one or other of two contact levers at discretion. As he turns on one or the other he makes the needle traverse to the right to signify "all clear," or to the left to signify "stop." When the receiving signalman is warned by a bell that a signal is coming, he presses a knob, and so twitches the current from the bell instrument to the signal instrument. In doing so he draws back two ivory pins which allow the needle-pointer to traverse freely to either side; and when he releases the knob the pins start back and intercept the needle, and so fix it as a continued record. It is a distinctive attribute of this ingenious apparatus, due to the inventor of the soft iron ring and pointer, that extraneous magnetic force is absolutely powerless over its indications. While the apparatus is at work, Mr. Harley flashes a powerful magnet about it, above, below and around, in a way which would put the ordinary magnet-needle instruments of the needle-telegraph entirely out of the field, but without producing the slightest derangement in its signalling operations.

Messrs. Carr & Barlow, of Old Palace Yard, propose to dispense with the large staff of signalmen in working the block system, and to make the traveling engine which drags

the train do their work. The arrangement by which they conceive this may be effected is shown in a working model. A signal instrument is placed on the engine, where it is under the eye of the driver. When the engine enters upon a distinct segment of the railway, a trigger is pressed as its bottom passes a projection on the line, and this drops a screen on the signal instrument, and shows "stop," unless a preceding train has passed out from the other end of the segment, pressed down a lever there by its wheel, and turned on a backward current of electricity; then the current is communicated to the engine signal-instrument, at the same time that the trigger is pressed, by two curved metal springs on its bottom rubbing against corresponding metal plates on the line, and two screens are dropped on the instrument, one mechanically and one electrically, and "Go on," instead of "Stop," is displayed. Midway of the block-segment a transmission instrument and galvanic battery are placed, the former on a low post near the line. Contacts are made and electrical currents formed on this instrument by a very pretty contrivance. A kind of flat brass hammer falls into a wedged-shaped interval, separating two steel faces. When the hammer is down, the current passes from one steel face to the other through it; when the hammer is up, the current is interrupted. As the engine passes abreast of the transmission instrument it presses a lever by its wheel, drops one hammer, and establishes a backward current, and lifts the other hammer to interrupt the current coming in from the front. When the engine passes out at the far end of the block-segment it drops again the second hammer, and re-establishes its current to give the signal "All clear."

Locomotive Fire-Box Stays.

The engraving herewith represents a fire-box of one of the locomotives exhibited at Vienna, and shows the method of staying the crown-sheet, which is in some respects novel. It will be seen that the crown-sheet is arched at the corners, so as to remove very few flues from the flue-sheet. The central flat portion is then supported by long stay bolts through the



outer shell. A similar plan was adopted by Mr. S. J. Hayes, and is still in use on the Baltimore & Ohio Railroad. It has worked there satisfactorily for twenty years, and has the great advantage of lightness and strength, and also leaves the crown sheet more clear for the circulation of water than it is when the ordinary crown-bars are used.

The novel feature of the fire-box represented by our engraving is the man-holes on each side, from which the crown-sheet may be readily cleaned and all the stays and braces be examined without disturbing any other parts excepting the man-hole covers. The form of construction is, we believe, a very excellent one and worthy of imitation.

Budd's Stay Bolt Cutter.



We give herewith an engraving of this tool which we illustrated somewhat imperfectly some months ago. It is intended to cut off the ends of stay-bolts after they have been screwed into the fire-box plates. Heretofore this has been done with a hammer and chisel, the operation of which has a tendency to loosen the bolts in the holes. With this tool they are sheared off by cutting successively from different sides of the bolt. This is not only done without any jarring or injury to the bolt, but it leaves the bolt in much better shape for riveting up the head and can be done much more quickly than with the ordinary tools. We have letters before us from reliable parties who state that with this tool two laborers will in four hours do the work which would take a skilled workman four days. It has been in use in many of our locomotive and railroad shops, and is favorably spoken of by those who have used

it. Further information regarding it can be procured from Mr. Mark McGinn, who is agent for its sale, and whose address is Aurora, Ill.

Some Considerations on the Friction of Journals.

The following article, contributed by Prof. John E. Sweet, of Cornell University, to the *American Artisan*, will be specially interesting to Master Mechanics, Master Car Builders, etc., in connection with the standard car-axle journal:

The three laws of friction—first, the frictional resistance between a given pair of surfaces of any material is proportional to the pressure that keeps them in contact; second, the frictional resistance is unaffected by the area of contact; third, the frictional resistance is wholly unaffected by the relative velocity of the rubbing surfaces—are of course based on the assumption that the conditions remain the same; but to change either of the elements without at the same time changing the conditions is so difficult, and the change of conditions is so likely to escape our notice, that the old school mechanic is ready, with a fair show of reason, to dispute the reliability of the law; and the young mechanic is at a loss to reconcile the laws with the apparent results; hence to point out some of the causes that operate to change the conditions may assist in fixing the laws more firmly in the mind of the mechanic, and serve to influence the student to go to the bottom for the cause rather than bubble up with a conclusion. Both theoretically and practically it takes twice as much power to draw two bricks, one upon the other, along on a stone slab as it does one; but if in the place of bricks we take blocks of cast-iron, and in the place of a stone slab we take a perfectly flat iron plate, and lubricate the surfaces with a sufficiently limpid oil, it is possible to so proportion the parts as to make it take more than twice the power to move the two blocks than the one, because with the single block the bearing surfaces may be so proportioned that the lubricant will just be able to sustain the weight; whereas with the two blocks the oil would be forced out, and cast-iron upon cast-iron slides harder than cast-iron on oil. Again, if a very heavy lubricant (tar, for instance) was used, and the bearing surfaces were large, it might take much less than twice the power to move the two blocks than the one, because the resistance offered by the tenacious qualities of the tar would not be doubled by doubling the weight.

In considering the second law, which signifies that the brick on the flat stone will require the same power and no more to move it, whether it slides on the flat side, on its edge, or on an end, I mention some cast-iron surface plates we are making (and, by the way, this is intended as an advertisement). Placing two carefully together, one will glide upon the other by the slightest touch; so easily, in fact, that when placed at an inclination of one in eighty, or only an eighth of an inch in ten inches, the upper plate will slide off of the lower one readily; whereas, if the upper plate be set on edge, and with a surface equally well finished, it requires an angle as steep as one in eight before it will move at all. Again, if the two flat surfaces be slid together under considerable pressure it will require a force quite equal to the weight of the upper plate to move it; that is, if the plates are set vertical, one will not slide off of the other. In each case both the metal and the surfaces are in the same condition; but in the first place a thin film of air is caught and held between the dead true surfaces, serving as a very limpid lubricant. In the second place, the two cast-iron surfaces run together; and in the third place, the two surfaces are not only held together by the weight of the iron, but with a certain amount of atmospheric pressure in addition.† Thus we see that by carrying the experiment to an extreme we discover conditions well calculated to escape notice in ordinary practice.

The third law implies that if the brick was drawn along over the stone slab by a spring balance, the balance would always indicate the same strain, whether the brick was drawn at a speed of one mile an hour or twenty miles; but it is possible for slides to be made to work with apparently less friction at high speed than at low; that is, a lubricator might have just body enough to support a given weight at high speed, and yet be so light as to be crowded out at a low speed.

In applying the laws to journals another element comes in which is liable to confound one, and has not always been so clearly explained as to be comprehensible to the unscientific. Let us take, for example, a wheel one foot in diameter, mounted upon a shaft one inch in diameter: if a string be passed over the outside of the wheel and a weight attached to its end it will require a given weight to turn it; now if a shaft of the same weight, but of twice the diameter, be substituted for the inch shaft, it will require just twice the weight to turn it. The friction surface and speed of friction surfaces have both been doubled; but as the law says that neither makes the difference, then what does? Let us for a moment disregard the frictional resistance and substitute for it some other resistance, and then see what explanation would be accepted. Take the same twelve-inch wheel and one-inch shaft, attach a cord and twelve-pound weight to the shaft, and it will require but a full pound weight on the string over the wheel to turn it; whereas the two-inch shaft and the same twelve-pound weight will require two pounds full to turn it, because in the first case we have twice the leverage we do in the other; so no matter whether the resistance is friction or weight the difference is wholly accounted for by the difference in leverage, like all other uses of the lever—what is lost or gained in power is gain or loss in distance and time. But those are results, not the cause, and, unlike the use of the lever for lifting weights or performing work, this loss of distance is a help rather than a disadvantage. The introduction of friction rollers is but the introduction of compound levers. I am conscious that this is not the explanation given in the text-books, nor by what is considered the best authorities; but it is an explanation that seems to be readily comprehended by the unscientific, and there are a good many who can understand the action of a lever better than they can a mathematical demonstration, however lucid or conclusive.

The law that requires a given amount of power to accomplish a given amount of work in addition to what is lost in friction makes this study of loss by friction one of the three leading features in the construction of machinery; in fact, it about all centers on that one point; for good proportions and simplicity of construction are valuable because they are economical, and are economical mainly as they reduce friction, and thereby running expenses. To reduce loss by friction I have hinted at two modes, the one to make surfaces so generous in size and

* By a carefully conducted experiment to determine the lowest grade at which our plates would slide down hill, we got as low as one in 180, or one inch in fifteen feet; and one will have to get up pretty early in the morning to find a piece of ice which will beat that.

† This addition of atmospheric pressure on ordinary slides and journals would not amount to much; but the same principle operates, and some times to an alarming extent, on steam-engine pistons, to the destruction of the valves, the cylinders and the incompressible surprises of the builders. For example, take the Kansas-bottom kind, a solid piston with two light rings sprung in; if the steam passes the first ring, and fills the space between the two (for the solid part does not fit steam-tight), then the piston rides on the bottom of the cylinder with its own weight and more or less steam pressure in addition. The remedy is to make the joints in the rings steam-tight, or what is about as good, place the joints on the bottom where the piston itself will close the leak.

true in form that a limpid lubricator may be maintained between them, and the other is to take a leverage over it; the first involves the use of more material, a better quality and good workmanship; and the second, when carried to any extent, the use of complication. Large wearing surfaces amount to nothing unless they are true, for if there is a single point projecting beyond the general surface only so far as to break through the film of oil, the large surface is of but little avail until the point is worn away. Again, if the surfaces by any cause are thrown out of line, even to the smallest degree, and the pressure brought to bear on one side or end, the large surface is useless. Self-contained rigid frames and good workmanship, or self-adjusting boxes and slides, and also good workmanship, are indispensable requisites if the benefits of large wearing surfaces are to be obtained. To combine the advantages of large wearing surfaces with the advantages of leverage over the friction, the use of long small bearings at once suggests itself; but to this there is a limit. When the bearing is so long and so weak as to spring within itself to the extent equal to the thickness of the film of the oil, then the limit is passed. In line shafting, of a proper strength for the work it has to do, four diameters, in self-adjusting boxes, is certainly not too long, and no doubt a great percentage of bearings might be advantageously carried to the same proportions; but in an ordinary steam-engine, with ordinary boxes and anything like that proportion, the spring of the shaft and wrist-pin and the twist of the crank would prove fatal. Still to make them short is not necessarily the only resort; either increasing the size and strength as well as length, using self-adjusting boxes, or using whole instead of half cranks, balancing the strain on each end of the wrist-pin, will lead out of the difficulty. To determine just the best possible proportion for any special case would be very difficult, and to establish any formula that would hold good in all cases would be an endless, if not an impossible one; but this much may be said with tolerable safety: when a bearing heats and wears away it either has too small surface, what surface there is is not true, or the working faces are not in line, and it is often all three. And again, it may be said, without great fear of refutation, that when the engineer has to resort to special brass or bronze to stand the wear, and any specially complicated take-up device to prevent pounding, he has adopted costly remedies to overcome a complaint he did not understand. It costs less to run journals on oil than on bronze; not more in original outlay, while less attention, much less expense for fuel, and indefinitely less expense for repairs are required.

Number of Cars in the United States and Canada.

At the last convention of the Master Car-Builders' Association, its Secretary, Mr. Leander Garey, presented the following statistics of cars:

The whole number of cars on all steam roads of 4 feet 8 inches and wider gauges in the United States and Canada, at the close of the fiscal year ending with the year 1871, was as follows:

Whole number of 8-wheel cars.....	193,767
4-wheel cars.....	58,355
Total.....	252,122
Whole number of cars reported for 3 and 3½ ft gauge roads.....	212

There are in the United States and Canada 103 car manufacturing companies. These companies have built during the year ending May 31, 1873, the following number of cars:

CLASSIFICATION.	
Palace, sleeping and hotel cars.....	134
Passenger cars, all classes.....	579
Smoking cars.....	18
Baggage and smoking cars.....	15
Baggage and express cars.....	18
Baggage and mail cars.....	33
Baggage cars.....	63
United States postal cars.....	3
Total number of cars for passenger trains.....	663
Paymaster cars.....	6
Caboose cars.....	78
Fruit cars.....	734
Refrigerator cars.....	5
Grain combination.....	750
Box or house cars.....	11,331
Platform.....	5,694
Gondola.....	6,733
Double-bottom gondola.....	125
Double-deck cars.....	80
Hay (box).....	75
Stock cars.....	2,415
Eight wheel ore and coal cars.....	3,126
Four wheel ore and coal cars.....	3,216
Oil-tank (60 barrels).....	250
Oil-tank (64 barrels).....	300
Total.....	35,531
Construction cars.....	162
Steam shovels.....	52
Derrick cars.....	149
Hand cars.....	149
Making the whole number of cars built by car manufacturing companies during the year ending May 31, 1873.....	36,765

Cars of the various classes as follows have been built by railroad companies during the year ending May 31, 1873:

Day and night palace cars.....	69
Passenger cars.....	281
Smoking cars.....	14
Baggage and smoking cars.....	43
Baggage and express cars.....	84
Baggage and mail cars.....	27
Baggage cars.....	101
Postal cars.....	19
Paymaster cars.....	6
Caboose.....	831
Box or house cars.....	5,673
Platform cars.....	2,643
Gondola cars.....	2,543
Grain cars.....	129
Milk cars.....	152
Refrigerator cars.....	132
Hay cars.....	132
Combination.....	407
Oil and coal eight-wheel cars.....	3,119
Oil and coal four-wheel cars.....	3,201
Stock cars.....	1,452
Oil-tank cars (64 barrels).....	105
Construction cars.....	385
Hand cars.....	828
Derrick cars.....	19
Snow-plows.....	19
Service or pole cars.....	50
Whole number of cars built by railroad companies.....	22,345

The following cars have been built for narrow-gauge roads, namely, 3 to 3½-foot gauge, during the same time:

Passenger.....	16
Smoking.....	2
Baggage and smoking.....	1
Baggage.....	5
Box and house.....	17
Cars constructed by railroad companies.....	40
Add 85 cars for six months intervening between close of fiscal year of 1871 and June 1, 1872.....	85
Also number officially reported in 1871.....	212
Total for narrow-gauge roads.....	466

Add this to number of cars constructed by the car manufacturing companies, and we have for the number of cars which have been added to our rolling stock during the past year, 59,110. Allowing six months for the time between the close of the fiscal year of 1871 and the first of June, 1872, we will add one half of the number of cars constructed during the past year to the number officially reported at that time (1871), and we have for number of cars on the first of June, 1872, 281,667. Add to this the number manufactured during the past year, and it gives us for the total number of cars at the present time, 340,787.

The increase of cars here stated is under the actual number, as a few roads have failed to report.

These figures indicate that the increase of cars during the past year has been about 25 per cent., and if we add the cars rebuilt, it will make the increase fully that number.

Technical Education.

Mr. Walter Montgomerie Neilson, engineer (son of the inventor of the hot blast) recently read a paper before the Philosophical Society of Glasgow, in which he attempted to answer a question very frequently put to him as to the meaning of technical education. It meant the application of science to the arts, and it was simply what was called applied science. He divided the education required by those who carry on the industries of the country in an intelligent and successful manner under four heads: 1, primary instruction; 2, practical art instruction; 3, scientific art instruction; and 4, technical instruction. Primary instruction would happily henceforth be efficiently given under the new system of national education. In the primary schools he trusted a standard of education would be obtained sufficiently high to qualify artisans for receiving technical instruction at the technical schools. There must, however, always be science schools for those who desire to prosecute scientific studies beyond the standard of the national schools, and who might be able to go to the universities. The kind of scientific instruction, or the extent to which it should be carried to enable the technical student to follow out his studies successfully, would depend upon the kind of industry in which he was engaged and the position he proposed to occupy. Practical art instruction must be acquired in the workshop. Coming to the fourth division of the subject, technical instruction, Mr. Neilson said that the first and greatest difficulty would be to find suitable teachers. No teacher could give technical instruction unless he himself had practical skill. He must not only be learned in science, but skilled in the art or manufacture in which he was to give instruction, otherwise practical students would have no confidence in his teaching. The technical teacher must be a man of ordinary intelligence and information, learned in science and practiced in art, powerful in demonstration, and able to command the attention of men not habituated to study. He considered technical workshops unnecessary, although there might be exceptions where instruction, by an actual machine or process, might be more advantageously given than by models or drawings. He looked to the lecture-room as the great means of instruction for all departments of technical education, in conjunction with the experience gained in the workshop. The most important branch of technical instruction was drawing, in order that the students might be able to understand whatever was represented in plan or diagram; and it should be taught to all students. It had been asked, what was to be taught in a technical school? In answering this question, he took, as an example, practical engineering; and he said that in this branch the subjects to be considered would be—strength of materials, how to be found and calculated; qualities and weights of materials, simplest methods of finding them, etc.; the proper application of different materials to various uses in machinery—stability, construction, motion, friction, lubrication, etc., applied and worked out by static and dynamic laws, aided by an ordinary knowledge of chemistry. Shipbuilding would also be considered—forms of vessels, their capacities, strength, speed, details of construction for safety and durability; marine engines—power, form, boilers, combustion and so on. Mr. Neilson also gave examples of what might be taught by referring to mining, textile manufactures, glass-making, earthenware manufacture, commercial science, etc.; and he said that contrary to the opinion which some persons held that such subjects could be learned from books, technical education, above all things, could not be obtained from books.

The Seraing Works in Belgium.

An English newspaper gives the following account of this great industrial establishment:

"The Seraing works extend over an area of 200 acres, and are intersected in all directions by a total length of 34 kilometres of railway. A canal also runs through the works communicating with the Meuse. At present there are 9,000 persons employed in and about the works, and the company still require about 1,500 more hands, but there is some difficulty in obtaining them, as all the available labor of the surrounding districts is already absorbed. The first locomotive for the first Belgian railway was constructed at their works in 1834, and afterward they supplied all the engines for the early railways.

"The inspection occupied several hours, during which all the departments were visited in turn, the chiefs of each department, who are engineers of high qualifications, giving to the visitors detailed explanations of the several branches of the works. The working of the establishment comprises coal and iron mining, the reduction of the ores, the manufacture of cast and wrought iron and steel, the construction of machines and engines of every kind, boilers, bridges, ships—in fact, all classes of engineering work. There are offices for the direction, a special engineering department for the study of construction, a library, a laboratory and eleven special divisions for the practical working, which are managed by the chief engineers alluded to. Nothing can exceed the cleanliness, order and precision which prevails throughout the establishment, which was a matter of envy to many of the manufacturers and ironmasters from our own land.

"It is almost impossible to realize the magnitude of the works; a few facts and figures, however, respecting their administration may serve to indicate their extent. They employ nearly 200 steam-engines, of about 8,000 horse-power in the aggregate, and the wages paid amount to 8,500,000 francs per annum. The annual consumption of fuel is 350,000,000 kilograms, and the value of the yearly produce is estimated at from 25,000,000 to 30,000,000 francs. The company have an infirmary on the heights of Seraing, in a very healthy situation, which is kept by nuns. A special physician is attached to it, and an orphan asylum, containing at present 41 children of both sexes, adjoins it. The establishment also possesses a dispensary, which furnishes medicine gratuitously to the persons attached to the works and to their families. To each division a refectory is attached for the workmen's meals; some kitchens are added; baths are also fitted up at the collieries for the miners, of whom there are about 2,000. A society for relief and pensions has also been established for the workmen, but membership is not compulsory. The company also carries out of its own funds temporary relief and pensions to non-subscribers to the relief society. Up to the close of last year the Seraing Works had constructed 2,100 steam-engines of from 4 to 600 horse-power for all manufacturing purposes; 900 locomotive engines; 31,540 pieces of mechanical apparatus for manufac-

tures, mining, the reduction of ores, the manufacture of metals, building, sugar works, plate-glass manufactures, paper mills, spinning mills, besides girder and suspension bridges, and iron-clad turrets, etc."

Report of the East Tennessee, Virginia & Georgia Railroad Company.

This company, formed in 1869 by the consolidation of the East Tennessee & Virginia and the East Tennessee & Georgia companies, owns a line from Bristol, Tenn. (the southwestern terminus of the Atlantic, Mississippi & Ohio), southwest to Chattanooga, 242 miles, with a branch from Cleveland, Tenn., 25 miles northwest of Chattanooga, south to Dalton, Ga., 27 miles, making 269 miles operated.

The operations for the year ending June 30, 1873, were as follows:

Earnings from:	
Passengers.....	\$489,062 84
Freight.....	856,773 44
Express.....	14,090 00
Mail.....	57,457 50
Miscellaneous.....	10,975 68

Gross earnings (\$5,124 per mile).....\$1,378,358 46

Expenses for:	
Motive power.....	\$161,433 15
Maintenance of way.....	108,194 05
Conducting transportation.....	159,324 40
Fuel.....	80,016 25
Repairs of roadway.....	351,215 08
Sundry expenses.....	70,895 49

Total expenses (67.4 per cent.).....920,148 42

Net earnings (\$1,670 per mile).....\$458,210 04

Of the expenses, however, \$75,000 of the amount was expended for new rails, \$32,766 for ballasting, a permanent improvement, and \$35,000 increased value of freight equipment—\$142,766 in all—may fairly be classed as extraordinary expenses, which would reduce the actual operating expenses to \$786,382.42, or 57 per cent. of gross earnings.

As compared with the previous year, there is an increase of \$176,866.69, or 13½ per cent., in gross earnings, an increase of \$94,347.95, or 10½ per cent., in expenses, and an increase of \$82,518.74, or 18½ per cent., in net earnings.

The report says: "About two-thirds of the increase has been derived from local business, of which the largest items have been from coal and wheat.

"The increased production of iron and copper, and the good crops of the past year, have all contributed something toward the increase.

"In through business you lost quite heavily from the Selma, Rome & Dalton road, which, when successfully operated, is a valuable feeder, but its business is greatly damaged by litigation, which will probably last for some time to come.

"We have gained very considerably in through business from the Memphis & Charleston road, which is one of the gratifying results of the unification of the management of your company and that road, under Capt. Joseph Jaques, your very efficient Vice-President and Superintendent.

"The continued inefficient condition of the Alabama & Chattanooga road has been disappointing to our reasonable expectations, and has deprived your company of the benefits which you had a right to hope for from a road so advantageously located as a feeder to your line. We can only hope that you will not be much longer deprived of the benefits of this valuable connection."

The shipments of cotton from Dalton were 29,850 bales, a decrease of 19,826 bales from the previous year, mainly owing to the unsatisfactory condition of the Selma, Rome & Dalton road. The cotton shipments from Chattanooga were 114,795 bales, an increase of 32,683 bales, making the total number of bales carried 144,645, an increase of 12,857 bales. During the year 492 car-loads of stock were shipped out of East Tennessee, an increase of 138 car-loads. The wheat shipments were 713,776 bushels, an increase of 632,720 bushels over the previous year, when the crop failed in East Tennessee. The coal carried was 4,489 car-loads of 9-tons, an increase of 1,109 car-loads. The shipments of pig iron were 6,220 tons. In passenger earnings there was a slight decrease.

During the year 30.8 miles of new iron have been laid, 105,511 new cross-ties laid and 29 miles of ballast put under the track, besides additions and improvements in depots, water-stations and bridges. There is now 90.8 miles of new fish-bar iron in the track and 55 miles of rock ballast and 54 miles of gravel ballast under the track.

The motive power comprises 25 locomotives in good order and 16 in running order, 41 in all. The work done during the year, it is estimated, has increased the value of the locomotives \$20,000. During the year, 30 coal cars have been purchased and 68 box and 12 coal cars rebuilt. The company now owns 13 first-class, 11 second-class and 9 "half-seated" passenger cars, 3 postal and 4 mail and baggage cars, a total of 40 passenger-train cars; 350 box, 13 stock and 172 flat and coal cars, a total of 535 freight-train cars; 1 pay car, 1 wrecking car, 80 dump and 13 crank-and-lever cars, a total of 95 road and service cars, making a total of 670 cars of all kinds.

Reference is made to the projected connection with the Cincinnati Southern road, which is expected to bring a large accession of business. The early opening of the Atlanta & Richmond Air Line road is expected to increase competition for a large part of the through business, but it is hoped this will be made up by the increase of local and coal traffic.

As to the financial position of the company, the report says: "At the close of the fiscal year, four years ago, say June 30, 1869, the two roads, since merged by consolidation into the East Tennessee, Virginia & Georgia Railroad Company, owed as follows:

Funded debt, including bonds or notes given to the U. S. Government.....	\$5,659,056 05
Floating debt.....	\$245,553 57
Deducted cash and good accounts and bills receivable on hand.....	339,824 30
Total.....	\$5,564,789 32

Your total indebtedness not outstanding is as follows:

The funded debt, including bonds given to U. S. Government in settlement of former bonds or notes.....\$4,191,900 00
Deduct from the above the cost of the Morrisown & Rogersville roads, and the money loaned in the purchase of securities in the Western North Carolina road, and interest on same, which will be returned when these properties are sold.....453,906 28

Total.....\$3,737,993 72
Total reduction of the debt in four years.....\$1,926,791 60

"Your company is practically without any floating debt, as the money you have on hand and the amount due you fully equals all the floating debt you owe. It will thus appear that your indebtedness has been reduced within the past four years to the extent of \$1,926,791.60, and, at a very low estimate, the value of your property has been increased during this period fully \$500,000, making a total gain of \$2,426,791.60. Of this amount about \$1,372,000 was made in the payment of the State debt, and about \$400,000 in the settlement of the Government debt, making a gain in these transactions of \$1,772,000, and showing to have been received for the same time from the in-

come of the road, over and above operating expenses and the payment of interest on the indebtedness of the company, the sum of \$634,791.60. This sum is equal to an annual dividend of about 8 per cent.

"But we think that time will show that it was a wise policy to apply the income to the improvement of your property instead of dividing it. * * * We now believe, however, that we can divert a portion of the net earnings to the payment of dividends and still leave sufficient to meet your annual interest demands, and at the same time keep the property in a growing and improving condition, so as to meet the demands of a growing business."

"We have, therefore, declared a semi-annual dividend of 3 per cent. on the capital stock of the company, payable on the 1st day of October next, having applied the net earnings for the first half of the fiscal year toward the payment of the floating debt."

"The net earnings for the year, over all expenses, both ordinary and extraordinary, have been sufficient to pay the annual interest and a dividend equal to a little more than 7 per cent., but the surplus over the amount required for interest has been applied, as previously stated, to the reduction of the floating debt and to the payment of a sinking fund on the State indebtedness."

"The following changes have been made during the year in your funded debt, viz.: Increased by the sale of \$124,000 first-mortgage 7 per cent. bonds, and further increased by the entry of \$190,000 of 4 per cent. bonds, given in settlement with the U. S. government, in lieu of bonds or notes which were given at the time the property was purchased, for about \$634,000. This settlement was made and reported to your last annual meeting, but not in time to be embraced in your last financial statement. It has been reduced by the cancellation of \$12,000 of indorsed bonds purchased and used in the payment of the sinking fund to the State."

ANNUAL REPORTS.

Atlanta & West Point.

The road owned by this company extends from East Point, Ga., southwest 81 miles to West Point on the Chattahoochee River, and it leases 6 miles of the Macon & Western road from East Point to Atlanta, making 87 miles of road operated. At West Point connection is made with the Western Railroad of Alabama. It is the only line leading directly southwest from Atlanta, and before the opening of the Selma, Rome & Dalton and Alabama & Chattanooga roads it was the main line for all business passing eastward and northeastward from Central and Southern Alabama.

The operations for the year ending June 30, 1873, were as follows:

Passengers from:	
Passengers.....	\$142,069
Freight.....	235,208
Mails.....	10,751
Express.....	8,657
Miscellaneous.....	2,629

Gross earnings (\$4.500 per mile).....	\$399,314
Operating expenses.....	\$268,619
Rent of road from East Point to Atlanta.....	6,100

Ordinary expenses (67 1/2 per cent.).....	\$269,649
Extraordinary expenses.....	29,531

Total expenses (75 per cent.).....	\$299,183
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Net earnings (\$1,151 per mile).....	\$100,161
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As compared with the previous year there is a decrease of \$13,764, or 34 per cent., in gross earnings; a decrease of \$31,182, or 10 1/2 per cent., in expenses; and an increase of \$20,418, or 25 1/2 per cent., in net earnings. There was a decrease of 11 1/2 per cent. in freight earnings, partly offset by an increase of 11 1/2 per cent. in passenger receipts.

During the year 12,902 through and 50,085 way passengers were carried, a total of 62,987, against 55,539 the previous year. The freight moved was 86,592 tons, against 103,100 tons the previous year. Included in the freight was 84,171 bales of cotton, an increase of 45,068 bales, or 115 1/2 per cent., over the previous year. A very large part of the cotton was through freight, and was carried at very low rates.

Two dividends, each of 4 per cent., were declared during the year.

The equipment consists of 19 locomotives, 7 passenger, 6 baggage, mail and express, 113 box, 18 stock, 23 flat, 3 coal and 5 caboose cars. Two new locomotives are being built, and more cars are much needed.

The capital stock is \$1,232,200, and the funded debt is \$102,500 in short bonds, making a total fixed capital account of \$1,334,700, or \$15,473 per mile of road owned—a very light capital account, probably the lightest in America, if not in the world.

Baltimore & Potomac.

At the recent annual meeting in Baltimore, the President of the company presented the following report:

"At the last annual meeting the road from Baltimore to Washington, having been completed and opened on the second day of July, 1872, had been in successful operation two months. On the first day of January, of the present year, the main stem from Bowie to Pope's Creek, on the Potomac River, was opened to travel, and two trains are run daily over it each way; one being a passenger train, and the other a mixed passenger and freight, thus affording ample facilities to a productive country heretofore dependent upon water transportation, after long hauls and over bad roads."

"On the 29th day of June, 1873, our passenger trains, which had previously been compelled to stop beyond the city limits, commenced to run regularly through the tunnel, to the depot on Calvert street. The tunnel, which far exceeds in its extent and cost any yet completed in this country, has been found to be perfect in its construction, and to give admirable satisfaction to passengers, who find not the slightest inconvenience from smoke, but experience sensations of surprise and pleasure in passing through its subterranean depths under the centre of a great city. The double track through it has been laid and ballasted."

"The depot and station houses at Pennsylvania avenue and Charles street have been sufficiently completed for use by passengers, and arrangements have been made with the Northern Central Railway Company for the use of its Calvert Station as the starting point of our trains. The Baltimore travel over the road has the unrivaled advantage of being able to take our cars at either of these three stations, or at Lafayette Station, or the stock yard, as may be most convenient."

"Satisfactory progress is being made upon the grand depot building in Washington. When completed its arrangements and conveniences will be perfect, and it is intended that it shall be an ornament to the national capital, which, if ever the projected park there is completed, and near the proposed ground of which it is located, will be one of its striking ornamental features."

"There are a few points on the main stem from Bowie to Pope's Creek where sidings are intended to be placed and proper freight and station-houses erected, which have not yet been done, but which will be very shortly, as the materials, having been in temporary use elsewhere, are now available for these permanent locations."

"Thus we have the road completed and its buildings nearly all erected. The last report detailed the character of the bridge-

ing, iron and other material used in construction, all of which have been the very best."

"The unprecedented freshets of last month, never known by the residents of the sections in which they prevailed to have been equaled in force and volume, did considerable temporary damage to the road, and caused an entire cessation of travel for several days. The earnest zeal and energy of the proper officers soon, however, restored the road and resumed the regular travel, including the through line to New York, which had just been opened by our tunnel and the Union Railroad, and by our late experience we hope to convert the annoyance and temporary loss into great permanent good."

THE SCRAP HEAP.

Temperance in Employees.

The following order has been issued to the employees of the Burlington & Southwestern Railway by Mr. E. B. Ward, the President:

"The use of intoxicating liquors by persons in the employ of this company is hereby prohibited, and the violation of this rule shall be deemed a sufficient reason for the discharge of any employee of the company at once and without regard to the time for which they may have been employed; and this rule will be strictly enforced."

The Detroit Tribune says:

"The head officers of the different departments of the Grand Trunk Railway have issued circulars to all the employees under their charge, requesting them to sign a pledge to abstain from all intoxicating liquors as a beverage. The officers' names head the pledge. This circular has been issued to the men on the Port Huron end of the road, and the Times there says that nearly all the employees have the matter under consideration, and that very many have already taken the pledge."

Railroad Manufactures.

The National Locomotive Works of Dawson & Baily, at Conneville, Pa., recently shipped a six-wheel locomotive to Salt Lake City, which is intended to work a grade of some 500 feet to the mile. To accomplish this the hind drivers have a grooved tire that is applied to the rail by a small steam cylinder attached to the engine, similar to an air brake, and can be applied to give any amount of adhesion needed.

A correspondent of the Philadelphia Press says that the Wilmington car shops have been discharging a large number of hands and reducing the wages of those who are retained. The cause of this reduction of working force is stated by one party to be a lack of cash orders, and by another to be an organized movement to reduce wages.

Negotiations are going on for a transfer of the works of the Ramapo Car Wheel & Foundry Company from their present location at Ramapo, N. Y., to Oneonta, N. Y.

The Wason Car Company, at Springfield, Mass., is building 100 refrigerator cars, to be used for transporting fresh beef from Texas to New York.

The Cole Manufacturing Company, at Lake Village, N. H., has just completed a new forge for the manufacture of car-axles and similar forgings. The works employ about 60 men. The car works of Murray, Douglass & Co., at Milton, Pa., employ 400 hands and turn out about 100 cars per month. Both passenger and freight cars are built.

The works of the Northumberland Car & Manufacturing Company, at Northumberland, Pa., are nearly completed and will soon be in operation. The company expects to turn out 50 cars per month.

Large car shops are being built by a new company at Bellefonte, Pa. The new concern expects to do an extensive business in freight and coal cars.

The Watson Manufacturing Company, at Paterson, N. J., now employs about 500 men, and has orders for iron bridges sufficient to keep the works fully employed for several months.

Seal Locks for Cars.

The Treasury Department has approved the report of the committee which selected the Miller lock for the use of the department. A Washington despatch says of these locks:

"There is a misapprehension with respect to the seal-lock. It is not the intention of the Treasury Department to compel railroad companies to change the locks now in use for the Miller lock, which has just been adopted. The railroads will be permitted to use the present locks until they are worn out, and all new locks will, it is understood, be chosen from the Miller pattern. The special advantages of the Miller lock are that the seal cannot be removed without the lock is opened without utterly destroying the seal. This principle was not embodied in any of the other locks presented. There is also a misapprehension with respect to the cost of the locks. The cost of the locks now in use is \$4.25, while Miller offers his locks at \$3.75, which is the mere cost of the manufacture. The Miller lock is the invention of an expert in locks, who had no great company to back him, and it is adopted solely on its merits. The seal in these new locks cannot be replaced, except by the forgery of the collector's name. This gives special advantages of punishment for tampering with the locks. With the locks now in use the seals can be removed, the lock tampered with and the seals replaced without injury. Parties guilty of this can now only be prosecuted in an action for trespass or tort, but persons destroying the seal of the Miller lock and replacing it by a forged one are liable to prosecution for forgery."

Fast Time.

The Fort Wayne (Ind.) Gazette of September 18 says: "On Tuesday, passenger train No. 1, on the Pittsburgh, Fort Wayne & Chicago Railway, engine No. 206, J. C. Fleming, engineer, from Crestline to Fort Wayne, and engine 199, Tony Keller, engineer, from Fort Wayne to Chicago, left Crestline two hours and fifty minutes late, and arrived in Chicago thirty-six minutes late, having made up two hours and fourteen minutes. The exact time from Crestline to Chicago, a distance of 277 miles, after deducting twenty-five stops, was five hours and forty-six minutes. The run from Fort Wayne to Chicago, not counting stops was 57 miles an hour."

The two engines named were built in the company's shops at Fort Wayne.

New English Railroad Law.

An English journal says: "On the 1st instant the Act of the late session to make better provision for carrying into effect the Railway and Canal Traffic Act, 1854, and for other purposes connected therewith, came into operation. The offices of the new Railway Commissioners are in the committee-room of the House of Lords; and as traffic includes 'passengers' a more extended supervision for the benefit of the public will now be exercised. Besides the three Commissioners appointed there are two Assistant Commissioners and clerks. The Commissioners may from time to time call in aid assessors, persons of engineering or other technical knowledge; the decisions of the Commissioners or orders may be made a rule of one of the superior courts and enforced. Among their powers the Commissioners are to consider whether the granting of a rate is a due and reasonable facility in the interests of the public, and whether, having regard to the circumstances, the route proposed is a reasonable route, and are empowered to allow or refuse the rate accordingly. There are provisions, as to the conveyance of mails by any train—Every railway company shall afford all reasonable facilities for the receipt and delivery of mails at any of their stations, without requiring them to be booked or interposing any other delay. The Commissioners are to decide all questions of law and fact; may require the attendance of all

persons and documents, and when sitting in open court may punish for contempt; they are to sit either in open court or in private, but any complaints to be made in open court; they may 'sit at such times and in such places and conduct their proceedings in such manner as may seem to them most convenient for the speedy dispatch of business.' Considering the powers conferred on them, and the public interests under their charge, a better state of things may now be expected in railway traffic, and protection afforded to passengers both as to their luggage and lives."

Fracture of Cast-iron Pier Cylinders.

Mr. John C. Trantwine, the well-known civil engineer, recently communicated to the Franklin Institute the following item of interest relative to the fracture of cast-iron pier cylinders: "It is not perhaps generally known to the profession that cast-iron cylinders, composed of sections bolted together through inside horizontal flanges, and filled with concrete, as is usual when employing them for bridge piers, etc., have, in several instances in the United States, split or cracked asunder entirely around the circumference, under the influence of extreme cold weather. The reason of this, I presume, is, that the outer and more exposed cylinder tends to contract to a greater degree than the inside and more sheltered concrete, and that the hold which the inside flanges have upon the solidified concrete in which they are imbedded prevents the contraction from taking place without rupture of the cylinder. Unless suitable means be applied to prevent this, the efficiency of such cylinders may be much impaired. It has been suggested that an inside lining of vertical wooden staves, projecting inward as far as the flanges do, will be an effective remedy. Other methods will, no doubt, present themselves. My object is simply to give greater publicity to an important fact."

Volume of Air Needed Per Individual.

An interesting paper has been communicated to the French Academy by Gen. Morin, on the cubic space and the volume of air necessary to insure healthiness in inhabited places. He constructs a mathematical formula expressing the amount of air necessary to be renewed hourly, so that the noxious gases (CO₂, &c.) emitted may not accumulate beyond a certain proportion not far from that in normal pure air, which contains about 0.0005 CO₂. The following numbers are obtained:

	cub. m.	cm.	cm.	cm.	cm.	cm.	cm.	cm.
E (Cubic space per individual.)	10	12	16	21	30	40	51	69
x (amount of air to be renewed hourly for each.)	90	88	84	80	70	61	60	40

The formulas and results are of much practical value. Thus, a bedroom 60 cubic metres capacity is generally thought sufficient for one person; but there should be an hourly circulation of 40 cubic metres in it, so that CO₂ may not exceed 0.0005. The ventilation of an amphitheatre at the St. Romain, and other public buildings, is shown by the author to be enormously defective. In hospitals an allowance of 50 cm. to each bed, with an hourly renewal of 60 cm. gives good results.

Pneumatic Regulator for Oil Lubricators.

M. L. Becker, constructor at Offenburg, has introduced a regulator for car lubricators in which oil is used, allowing the latter to act in the usual way when the train is in motion, but stopping the supply of oil with the stoppage of the train.

The regulator consists of an elliptical vessel, funnel-shaped, which is fixed by means of a screw on the top of the oil-box, and within it is a small ball which, when the train is not in motion, falls to the bottom, closes the orifice there against the air, and arrests the flow of oil; when the train begins to move, the ball rotates around the hole which is thus left free. Six months' trials have proved that the ball acts with perfect regularity, and that being always greasy it does not show any perceptible wear. The effect was shown by placing one of these regulators on one side of a locomotive, and it was found that the consumption of oil was 35 per cent. less than at the other end of the same axle, not so provided.

The new regulator does not interfere with the replenishing of the box, but with the oil chamber may be made large enough to require filling only once a day; it also keeps the wick and oil remarkably clean. These little appliances cost from 23 to 33 francs per dozen.

Locomotives in England.

At the close of 1872 the number of locomotives owned by each of the leading railroad companies of the United Kingdom were as follows: Great Eastern, 442; Great Northern, 496; Great Western, 1,009; Lancashire & Yorkshire, 566; London & Northwestern, 2,001; London & Southwestern, 299; London, Brighton & South Coast, 293; London, Chatham & Dover, 114; Manchester, Sheffield & Lincolnshire, 303; Midland, 981; Northeastern, 1,017; Southeastern, 243; Caledonian, 597; Glasgow & Southwestern, 207; North British, 417, and Great Southern & Western (Ireland), 125.

How She Takes the Train.

A writer in the *Peoria Review* describes as follows a lady traveler whom most conductors will recognize:

"She comes down to the depot in an express wagon three hours before train time. She insists on sitting on her trunk out on the platform to keep it from being stolen. She picks up her reticule, fan, parasol, lunch basket, small pot with a honeysuckle plant in it, shawl, paper of candy, bouquet (she never travels without one), small tumbler and extra veil, and chases hysterically after every switch-engine that goes by, under the impression that it is her train."

"Her voice trembles as she presents herself at the restaurant and tries to buy a ticket, and she knocks with the handle of her parasol at the door of the old disused tool house, in vain hopes that the baggage man will come out and check her trunk. She asks everybody in the depot and on the platform when her train will start, and where it will stand, and looking straight at the great clock asks: 'What time is it now?' She sees, with terror, the baggage man shy her trunk into a car where two men are smoking, instead of locking it up by itself in a large, strong, brown car, with 'Bad order; shops,' chalked on the side, which she has long ago determined to be the baggage car, as the only safe one in sight."

"Although the first at the depot, she is the last to get her ticket, and once on the cars, she sits to the end of her journey in an agony of apprehension that she has got on the wrong train, and will be landed at some strange station, put in a close carriage, drugged and murdered, and to every last male passenger who walks down the aisle she stands up and presents her ticket, which she invariably carries in her hand."

"She finally recognizes her waiting friends on the platform, leaves the car in a burst of gratitude, and the train is ten miles away before she remembers that her reticule, fan, parasol, lunch basket, verbena, shawl, candy, tumbler, veil and bouquet are on the seat where she left them, and in the depot at Peoria, for the life of her she can't tell which."

Light Engines and Heavy Work.

The Ohio Iron Company at Zanesville, has a tank switch locomotive that pushes eight loaded cars of 150 tons up a grade of 185 feet to the mile on a curve of 100 feet radius. It also takes 75 tons up a 290 feet grade, in both cases starting on the grade. This engine weighs 18 tons, has cylinders 12 inches diameter by 18 inches stroke and was built by Porter, Bell & Co., of Pittsburgh, Pa. Another engine of the same size and build at the Superior Rail Mill, Pittsburgh, with the advantage of a short run, takes eleven cars, or a little over 200 tons, up a 140 feet grade where a large engine can only take eight cars.



Published Every Saturday.

CONDUCTED BY
S. WRIGHT DUNNING AND M. N. FORNEY.

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Editorial Announcements.

Removals.—The Chicago office of the RAILROAD GAZETTE has been removed to No. 77 Jackson street, opposite Third avenue.
The New York office of the RAILROAD GAZETTE is removed to Room 131, No. 73 Broadway, opposite the upper elevator landing.

Correspondence.—We cordially invite the co-operation of the railroad public in affording us the material for a thorough and worthy railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.

Inventions.—No charge is made for publishing descriptions of what we consider important and interesting improvements in railroad machinery, rolling stock, etc.; but when engravings are necessary the inventor must supply them.

Articles.—We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

THE PROBABLE DEMAND FOR RAILROAD SUPPLIES.

Since the financial troubles—recent financial trouble, perhaps, we should say—there has been such a falling off of orders for rails, rolling stock and other railroad supplies, and so strong a conviction that the construction of new railroads will decline still more than it has heretofore this year, that manufacturers and dealers have had reason to inquire whether the depression of their business is likely to be permanent or merely temporary, and so whether they should prepare for it by discontinuing production largely. At first sight it seems as if the largest part of the demand would be cut off should we construct no, or very few, new railroads for a year or two, after we have constructed 25,000 miles within four years. A new railroad must be supplied throughout and it might be assumed that the 12 per cent. increase of railroads in 1873 would require a stock of materials equal to nearly one-eighth of all that was in all the railroads built in the thirty years previous.

Now, it is hardly necessary to point out the error in this assumption to one who has dealt with railroads for some time. For the benefit of others, however, perhaps we should call attention to the fact that the average railroad, as it leaves the contractor, has not on it nearly so much material as the average of the older lines. And this is true of nearly all material. The very rails are fewer in number (from the lack of sidings and second tracks), and, because of their poorer quality, of shorter life. If the road has paying traffic it will be a customer for these the first year of its working. Of rolling stock the lack is usually very great. The road has just as little as it can get along with, while its traffic is beginning to develop. Unless it is wretchedly located, the demand for cars and locomotives must be considerable from the beginning. And scarcely ever does a new railroad have the shops and machinery necessary for constructing its own rolling stock. It is considered well provided if it is able to fully keep up its repairs. So the demand on the manufacturers for finished rolling stock is likely to be larger, in proportion to its consumption, from a new railroad than an old one. Materials for rolling stock are in demand, of course,

in proportion to the consumption, whether the locomotives and cars are manufactured by the railroad corporations or by private firms and companies. This consumption of rolling stock, on the average, is determined by the amount of traffic, and the large purchases of new companies affect it only when said companies buy more than they have use for. Probably very few companies have done this, and we know that many of the older companies, in spite of great efforts to supply themselves, still find their traffic too much for them. It is hardly possible that the consumption of rolling stock should decrease, though possibly it may not increase with the rapidity expected and provided for by some manufacturers. So long as our traffic grows, we shall wear out more and more cars and locomotives yearly, and the traffic of the country is growing as fast as ever it did, probably.

This, however, does not prevent a present cessation of demand and the countermanding of many important orders, such as that which has induced the Rogers' Locomotive Works to discharge nearly two-thirds of its workmen recently, when the certainty that a new railroad would not be able to sell its bonds, and therefore would have nothing to pay for the engines which it had ordered—which, indeed, were in great part completed, or nearly so—caused the company to countermand its order, or signify its inability to pay for the engines when delivered, and so left the Works with a large stock on hand, which would be likely to suffice for supplying new orders for some time to come. So, generally, new railroad companies may cease to be customers for supplies, the aggregate consumption of which, however, for a year or two to come, will be not much affected by that fact.

We have elsewhere given some statistics of the number of cars manufactured in the United States in the year ending with May last, which was, of all descriptions, about 59,000. In that year we constructed about 7,000 miles of new railroad, but as we have no records of the rolling stock owned by these new roads, we cannot say how large a proportion of the stock they required. But at the close of 1871 the average equipment of the roads then completed was at the rate of 4½ cars per mile, and even if the new lines were equipped at this rate (and doubtless they were not at half that rate) 30,000 of these 59,000 cars must have been constructed for the old roads. It would be safe to say, doubtless, that not one-fourth of the new cars go to the new railroads, but as the old companies construct a large part of their cars and the new ones scarcely any, this quarter forms the largest part of the business of those who manufacture for sale. As we have said, however, in the long run, only so many cars are bought as are worn out by the traffic; the traffic depends chiefly on the production of the country; and the production of the country will be very little affected by the construction or non-construction of new railroads for some time to come.

With relation to rails, the Statistical Report of the National Association of Iron Manufacturers gives the manufacture of this country 750,000 tons, and the imports 472,860 tons in the year 1873, making a total new stock of 1,222,860 tons. The mileage of track laid on new railroads during that year was about 7,400, and with sidings the consumption per mile would probably average about 100 tons, so that the consumption on new roads was about 740,000 tons, and there is left 482,860 tons only for renewals. The mileage in the United States at the close of 1871 was about 60,000, including all the heaviest worked lines, so that the average amount of rails used in renewals appears to have been only eight tons per mile, which is equivalent to a renewal once in 12½ years, and it seems impossible that the average life of rails on our roads can be nearly so great. It is usually counted at no more than seven years; but the lines vary greatly in this respect, some giving three years as the utmost life of their rails, while on others, doubtless, the rails will rust out before they wear out. Really, the only basis we have for an accurate estimate of the average life of rails on American railroads is the yearly consumption, and we do not know that there are any more trustworthy statistics concerning this consumption than those we have given.

We may, however, get nearer to the truth by taking a series of years, instead of a single one. During the four years beginning with 1869, we constructed just about 25,000 miles of new railroad, having about 43,000 miles at the beginning of that period. In those four years the report before referred to gives the manufactures of rail in the United States as 2,593,586 tons, and the imports as 1,831,363 tons—a total of 4,474,949 tons. Subtracting the 2,500,000 tons needed for the new lines, we have 1,975,000 tons as the quantity used for renewals in four years. This affords an average of 9.7 tons per mile, for renewals, which is seen to be somewhat more than for 1872, as was to be expected, as a much larger proportion of the whole mileage of the country was new in 1872, and therefore needed fewer renewals. Indeed, most of the new roads constructed within the past four or five

years have a comparatively light traffic, their aggregate renewals as yet must have been very small, but some of the older are fast getting to the point where they will need large renewals, the more so as a great part of them were laid with the cheapest iron to be had in the market. The figures indicate plainly, however, that the average life of rails throughout the United States during the four years ending with 1873 was more than ten years. Accepting this as the standard for the future, we will need next year something more than 700,000 tons of rails for renewals alone. Now this is a great deal less than last year's consumption, it is true, but then we are not going to give up railroad construction entirely. On the contrary, whatever may happen with new schemes, there is reason to believe that there will be a great increase in the construction of second tracks and sidings; and at all events iron-masters will, on the average, have to supply what the traffic of the country wears out and no more. If, as recently, there is a construction of railroads in excess of the traffic, then the traffic is more divided, and the average life of rails increased, so that there is less demand than there would have been otherwise from the older roads. It is nevertheless true that by an over-construction a stock of rails is laid up for the future, so that the stimulating effect on the rail market is less felt for the first few years.

American ironmasters, however, have another source of consolation in the rapid disappearance of British competition. The British rail exports to the United States for the eight months ending with August were 141,330 tons in 1873, against 340,321 in 1872, and the falling off in these exports has been progressive, less than one-twentieth of the total for the eight months having been exported in August, which was little more than one-sixth of the exports for the same month of 1872. And, indeed, unless there is a radical change in the condition of iron manufacture in Great Britain—until coal and labor are very much cheaper than they now are—American rails will be supplied almost exclusively by American mills. Now we have seen that hereafter the renewals alone will be almost equal to the consumption of American rails last year, and with an almost total cessation of construction by new companies, we believe that the consumption of rails in the United States will necessitate an increase instead of a decrease in the production of American mills, should there be no increase in imports.

Generally people make the mistake of looking upon a railroad structure as a permanent property, something like a block of stores or a warehouse. Those who study maintenance and renewal accounts need not be told that it is a very small proportion indeed of a railroad property which at all approaches in permanency masonry buildings. The very road-bed is being continually wasted away by the elements, and needs constant renewals; the ties decay in a few years; the iron rails are worn out or go to pieces in a shorter time, under heavy traffic; the rolling stock wears rapidly, and nearly the entire property is entirely renewed at not very long intervals. The work of new construction may cease temporarily; the work of reconstruction goes on and must go on forever.

THE PERILS OF COUPLING CARS.

It is quite certain that several thousands of people are now disabled every year in this country alone in coupling cars. The amount of suffering and misery which is thus caused it is impossible to conceive. Injuries of almost every degree, from the loss of a finger to the loss of life, are inflicted, and the horrible mutilation and agony which many of those thousands are obliged to endure are sickening to contemplate. We are fortunately so constituted that the recollection of pain soon grows dim and vanishes, so that it is impossible to give even a very faint conception of the intensity of suffering, the wild delirium of pain which the victims of such accidents often suffer. Of the aggregate amount of mere bodily agony which is endured by them no human being can form a conception. The secondary misery which follows is perhaps even greater than the first. Poverty and want often stand in wait at the bedside and haunt the steps of the poor victim's faltering crutches. It is often easier to endure bodily pain than to be helpless and know that others are suffering because we are powerless to give aid, and perhaps none of us can realize the unhappiness of those who are hopelessly disabled for life, and unable to defend those who have a right to their protection. In all ages men have grown eloquent over the evils of war, yet how little is said of the destruction of life and limb from the cause we have indicated. The killed and wounded are, as we have already pointed out, annually equal to that of a battle. One reason, we believe, why this has attracted so little attention is that very little, or, we might say, no accurate knowledge exists regarding the extent of the evil. The injured are nearly always obscure people, and the accidents often occur in out-of-the-way places. Many of them are re-

ported in the newspapers, but more are not. Even those which are reported stand as isolated instances, no systematic effort having as yet been made to collect complete records of such accidents. In fact, it would be impossible, without incurring enormous expense, to gather such statistics which would at all approximate accuracy. An effort is made, it is true, to collect a monthly record of railroad accidents in these pages, which is believed to be tolerably complete so far as accidents which are matters of public interest are concerned; but this record is confined exclusively to *train* accidents, and takes no account of injuries to persons while coupling or crossing tracks. When some poor fellow has his hand or his arm or leg taken off in the dead of night, or in the wilderness on the Union Pacific, in the mountains of Virginia or uninhabited prairies of the West, the event, and often the life of the sufferer, passes away unheeded, excepting perhaps to a few to whom he was as near and dear as the reader is to those who love him. Hundreds of such cases occur, and no sound is made which the public hears.

In some States railroad companies are required by legal enactment to report all such accidents, but most of these records are sadly imperfect. The magnitude of the evil is, therefore, not fully known, nor can it be presented in any such authoritative form as to attract public attention. There can, however, be no doubt that the aggregate loss of life and injury from coupling cars is enormously great and increases as railroads and their business grow.

The question which then presents itself is, how can this enormous evil be lessened, if not entirely prevented? It is quite true that a very large proportion of the injuries which are received are due to carelessness, but that is one of the elements of the problem. It is quite impossible to change the nature of the men who must be employed in this work, and therefore reform in that direction is quite hopeless; but it may be practicable to alter the design and construction of cars, so that accidents will not be liable to happen, even with a certain degree of carelessness. The problem is, how to save the lives and limbs of the kind of men who now couple our cars; it is not how to save a perfected class of men, such as the world thus far knows nothing about.

It is of course very much easier in most cases, but especially in this, to point out the evil than it is to show how it is to be remedied. We may announce, therefore, at once, that we do not propose to offer a remedy, but only to try to indicate the extent of the evil, and suggest some methods of inquiry and research to determine the most effectual way of diminishing this lamentable injury to life and limb.

The Union of German Railroad Administrations, as was noticed in last week's RAILROAD GAZETTE, have offered a prize of \$750 for the invention of a contrivance by means of which the coupling of railroad cars can be effected without the necessity of stepping between them. The award of the prize is governed by certain conditions which were fully explained in the notice referred to. This fact indicates that the same subject is attracting attention in Germany, and certainly its importance is deserving of attention here.

There are now, we have been told, over 800 patents in this country on car-couplers. It is quite possible that a careful examination of these inventions, by a competent and disinterested person, might reveal some practicable method of coupling cars either automatically or in some way which would avoid the necessity of going between them. Generally, however, it will be found that the great majority of such inventions are utterly useless and ineffectual in accomplishing what is needed. Each inventor, of course, thinks that his device is the only thing which will do what is needed, and whoever undertakes to investigate this subject must expect to encounter a vast amount of dreary ignorance and importunity from such inventors. The great mass of them have never studied this or any other subject with care, or observed the conditions which must be fulfilled in order to make the apparatus for coupling cars practicable. It is, of course, possible that some invention may be provided by which cars may be coupled without incurring any danger in doing it, but we believe that in this case much more can be immediately accomplished by improving the existing forms and methods of construction than by attempting to introduce more sweeping reforms.

In a few minutes' conversation with almost any intelligent brakeman one can learn which kind of cars is considered most difficult and dangerous to couple. The reasons for this opinion can also usually be traced out. It will often be found, however, that while the opinions of such men are sound, the reasons they give for holding them are not. The opinions and impressions are the result of observation and the daily training which practice gives them, but their reasoning is often mere prejudice. In other words, such men are experienced in the art of coupling cars, but very inexperienced in the use of the powers of reasoning. It is not, however, very difficult

to discover with the aid of such men the peculiarities in the construction of cars which makes them dangerous. As an example, let us take the construction of the ordinary wrought-iron draw-head. Usually the space allowed between the buffer-beam or dead-wood and the coupling-pin is so little that if the draw-head is forced back by contact with the adjoining car, the hand of the person attempting at the same time to draw the coupling-pin will be and often is crushed between it and the dead-wood. Now, obviously the cure for this would be either to allow more space between the pin and the car, or else put a stop of some kind to prevent the movement of the draw-head farther than a certain point, and thus allow room enough for a man's hand. It will also be found that on many cars blocks of wood or iron castings are placed in such positions that a man cannot reach the coupling link or pin without assuming a very constrained and awkward position, or exposing some portion of his body to the danger of crushing in case the collision of the cars is at all violent, as it often is. In other cars there is too little room allowed between the platforms or buffer-beams for a man to stand when both draw-heads are compressed. In others bolt-heads and sometimes the side sills are allowed to project so that a man is liable to be caught between them, especially on sharp curves. We mention these only as examples of dangerous forms of construction. Our list is not intended to be at all complete, but only to indicate how, by getting the experience of the men who are exposed to these dangers, their cause may be discovered. Much information could also be gained if, on through lines, over which cars from other roads are run, a careful record were kept of such accidents, and of the kind of cars which caused each.

One of the most inexpressibly horrible calamities which can befall any human being is that which is caused by a person having his foot inextricably caught in a frog, switch or guard-rail in front of an approaching train. Such accidents do occur, how often no one knows. The only preventive we know for them is to have the spaces where it is possible to catch a man's foot filled up with wood.

On one road we know of men were required to hold the coupling link with a stick, so as to avoid crushing their hands. Strange to say the order obliging them to do this met with the most violent opposition from the men themselves.

Careful investigation of the accidents which now occur would, we believe, inevitably show that a large number of them are preventible by improved forms and methods of construction, and these improvements could be made without departing materially from the present way of building cars. If, however, any practicable invention will make it possible to couple cars without going between them, that invention will be the means of preventing an immense loss of life, and of saving incalculable suffering. What we want to make as clear as we can is, first, that cars of the ordinary method of construction can *certainly* be made safer, and that to make them so it is only necessary to exercise ordinary intelligent observation; and, second, that some invention *may* be practicable which will eliminate almost entirely the danger from coupling cars. At the last convention of the Master Car-Builders' Association, a committee was appointed to report upon this subject. If they do nothing more than collect statistics of the number of people injured from coupling cars, they will do a great service, as they will thus draw public attention to a subject that sadly needs it. They can, however, do much more than this: they can get the results of the observation of most of the members of the Association, who for years have had opportunities of learning the causes which make coupling cars so dangerous.

Should the committee undertake to investigate the merits of inventions for coupling cars, their task, we fear, will not be an enviable one. To say nothing of the magnitude of the undertaking, it would, we think, be a very serious matter to be obliged to listen to all the patentees of such devices who would want to recommend their inventions. The responsibility of this committee is very great, as they have it in their power to stay in a measure the great waste of human life and limb which each year are sacrificed because so little effort is made to prevent it. Seldom is such an opportunity of being useful to our fellow-creatures afforded to any of us.

The Shrinkage in Prices of Stocks.

On reopening the New York Stock Exchange on the 30th ult., after having been closed since the 20th, the sales were only tolerably large, and at prices which were nearly the same as those made on the street, irregularly, the day before. The enormous shrinkage in prices (with of course, absolutely no shrinkage in values meanwhile) within a fortnight is shown by the following table, in which we have given (preceding the name of each com-

pany), also the number of shares of each stock sold on the 30th:

	—PRICES—		P. & T of
	Sept. 15.	Sept. 20.	decrease.
310 Atlantic and Pacific preferred.....	23½	16	23
300 Boston, Hartford & Erie.....		17½	10
338 Central of New Jersey.....	101½	91½	10
4,250 Chicago & Northwestern.....	19	42	29
650 Chicago & North-western preferred.....	79½	64½	19
261 Chicago, Burlington & Quincy.....		91	14
4,275 Chicago, Rock Island & Pacific.....	105½	91	19
500 Cleveland & Pittsburgh guaranteed.....		75½	
200 Cleve. Col. Clin. & Ind.....		79	19
500 Col., Chicago & Indiana Central.....	95½	88	10½
2,135 Del., Lac. & Western.....	98½	85	16
5,100 Erie.....	58	51½	11
550 Erie preferred.....		33	27
1,570 Hannibal & St. Joseph.....	33	24½	27
10,112 Lake Shore & Michigan Southern.....	91½	75	18
111 Michigan Central.....		60	20
2,680 Milwaukee & St. Paul.....	46½	34	26
600 Milwaukee & St. Paul preferred.....	54½	59	15
2,363 New York & Harlem.....	128½	114½	14
10,695 New York Cen. & Hudson River.....	113½	91½	12
4,250 Ohio & Mississippi.....	37½	29½	21
6,250 Pacific Mail.....	43½	34	21
300 Pennsylvania.....	115½	95	18
550 Pitts., Ft. W. & Chicago guar.....		100	
500 Rensselaer & Saratoga.....		60	45
3,600 Toledo Wabash & Western.....		40	55
5,325 Union Pacific.....	21½	19½	20
13,500 Western Union Telegraph.....	89½	66½	50

The enormous shrinkage in prices will be more striking, perhaps, if we calculate the amount of the depreciation on the whole amount of stock of some of the prominent companies, as we have done below :

Central of New Jersey	\$1,600.00
Chicago & North Western common	1,500.00
Chicago & North Western preferred	8,900.00
Chicago, Rock Island & Pacific	3,390.00
Delaware, Lackawanna & Western	2,100.00
Erie, common	4,980.00
Lake Shore & Michigan South-rn.	7,900.00
Milwaukee & St. Paul	1,450.00
preferred	1,000.00
New York & Harlem	1,490.00
New York Central & Hudson River	10,000.00
Panama	1,400.00
Toledo, Wabash & Western	2,300.00
Union Pacific	1,800.00
Western Union Telegraph	8,300.00

These are dividend-paying stocks, with the exception of the three last named, while three others are irregular in making dividends. We see that the difference in the prices offered for these fourteen properties at the beginning and end of the fortnight amounted to the enormous sum of \$54,910,000. The shrinkage has naturally been greatest in the stocks which pay dividends irregularly or not at all, not necessarily because these were proportionally higher before the panic, but because the greatest part of the dividend-paying shares are held for investment and not thrown upon the market, and when they are offered investors who will touch no other stocks at any price take them up readily.

Nevertheless, the decline in the best stocks has been enormous, and those who have sold New York Central at the last price given on the 30th ult. did what was equivalent to paying nearly 9 per cent. in perpetuity for the use of money, while the buyers of Lake Shore we believe to be pretty sure to get 10½ per cent. on their investment henceforward. In the case of the latter, its price doubtless was unduly depressed by the fact that it was a large debtor to the Union Trust Company, having, in fact, borrowed the money to pay its last dividend. When this was learned, the vast crowd of those who jump at conclusions assumed at once that the money for the dividend was borrowed because it was not earned, in spite of the published facts that the earnings of the road have increased enormously, while it has spent several millions in adding to its property, the cost of which is to be paid eventually from the proceeds of bonds. The only fault to be found with the expenditures on account of new capital are that they are hardly sufficient, for the road, like others similarly situated, is sure to have all the traffic it can carry with all additions to its facilities, and the last additions to capital account are likely to be the most productive.

Railroad Time Standards.

The standards of time of the different railroads of the country are collected in the *Official Railway Guide* for October. We have counted the number of lines or parts of lines using the time of each place, from which it appears that the times of 71 different places are used as standards, and that the number of roads or parts of roads using each is as follows :

Routes or parts of routes using each is as follows:			
Chicago.....	51	Baltimore.....	3
Philadelphia.....	35	Cambridge, Mass.....	3
New York.....	39	Columbus, S. C.....	3
Boston.....	29	Denver, Col.....	3
Columbus, O.....	23	Dubuque.....	3
Albany, N. Y.....	13	Hannibal, Mo.....	3
Indianapolis.....	9	Memphis.....	3
Washington, D. C.....	8	Nashville.....	3
Jefferson, Mo.....	7	New Orleans.....	3
Louisville.....	7	Providence, R. I.....	3
St. Louis.....	6	San Francisco.....	3
Toulo.....	6	Seima, Ala.....	3
Detroit.....	6	Wilmington, N. C.....	3
St. Paul.....	5	Bangor, Me.....	3
Savannah.....	5	Buffalo.....	3
Cincinnati.....	4	Charleston, S. C.....	3
Hartford.....	4	Cleveland.....	3
Milwaukee.....	4	Galveston.....	3
Moline.....	4	Minneapolis.....	3
Montreal.....	4	Omaha.....	3
Portland, Me.....	4	Quincy, Ill.....	3
Richmond, Va.....	4	Vicksburg.....	3

While there is one each using the time of Atchison, Kan., Atlanta, Ga., Bath, Me., Hamilton, Ont., Houston, Tex., Jacksonville, Ill., Kalama, Wash. Ter., Knoxville, Tenn., Laramie, Wyoming Ter., Lincoln, Neb., Little Rock, Ark., Meridian, Miss., Moncton, N. B., New Haven, Conn., New London, Conn., Pensacola Fla., Pittsburgh, Pa., Port Hope, Canada, Portland,

Or., Portsmouth, Va., Rome, Ga., Salt Lake City, Utah, Shreveport, La., Sioux City, Iowa, St. Stephen, N. B., Terre Haute, Ind., Winona, Minn.

This accounts for 322 lines and parts of lines, and probably is quite incomplete and imperfect, though showing pretty well the condition of affairs. It is evident that this complexity could be vastly diminished with very little effort or inconvenience, even if it could not be exchanged for absolute uniformity, which we believe to be entirely feasible. Either New York, Philadelphia or Washington time would serve very well for all these places, and for the country as far west as Pittsburgh and Buffalo, except a part of New England, which might prefer Boston or Cambridge time, and so of the other districts. Or, if an absolute standard is wanted from observatory towns, Cambridge, Washington, Ann Arbor, Chicago or St. Louis, and Oakland, Cal., would serve the whole country.

Car Construction.

The valuable statistics concerning the stock of cars of various classes owned by the railroads of the United States and Canada, and of the number constructed by private companies and railroad companies during the year ending with May last, which Mr. Leander Garey collected for the Master Car Builders' Association, enable us to ascertain how large a proportion of this work is done in the shops of the railroad companies. We summarize the figures, omitting hand cars, which are given for the railroad companies only:

	CONSTRUCTED BY—	
	Priv. t. shops.	Railroad Companies' Shops.
Passenger-train cars.....	833	633
Freight-train cars.....	35,531	21,411
Service cars.....	31	408
Totals.....	36,755	22,517

The railroad companies are thus seen to have constructed about three-eighths of their passenger-train cars, three eighths of their freight-train cars, and about eleven-twentieths of their service cars, and 38 per cent. of the whole stock manufactured during the year.

The increase of rolling stock is also very well shown by Mr. Garey's figures. At the close of 1871 he reports 252,334 cars, and the construction during the year beginning six months later was 59,232, or about 23½ per cent. of the stock at the date named. Doubtless a large part of this new construction was for renewals, but with the largest possible allowance for that, the increase in stock must have been something like 15 per cent. The increase in railroad mileage was as much as 13 per cent., but of course the new mileage did not require so large a stock per mile as the average of the old—probably not more than one-third of that average, and the great bulk of the additions were made for old roads, to enable them to conduct the traffic which was pressing them.

Record of New Railroad Construction.

This number of the RAILROAD GAZETTE has information of the laying of track on new railroads as follows:

Dunsmuir's Creek.—Completed from Bedford, Pa., north 11 miles to Holderbaum's. *Milwaukee, Lake Shore & Western.*—Complete: by the laying of track from Sheboygan, north along the west shore of Lake Michigan, to Manitowoc, Wis., 25 miles. *Texas & Pacific.*—The *Jefferson Division* has been extended northward 7 miles to a point 33 miles from Jefferson, and the *Transcontinental Division* has been extended eastward 7 miles to a point 29 miles east of Sherman, Texas. *Cairo, Arkansas & Texas.*—Completed by an extension southward 41 miles to a junction with the Arkansas Division of the St. Louis & Iron Mountain Railroad at Poplar Bluffs, Mo. *Wasatch & Jordan Valley.*—Extended from Granite to Fairfield's Flat, Utah, 5½ miles. The road is of 3-foot gauge. *Paducah & Memphis.*—Extended from Obion southwest 4 miles to Trimble, Tenn. *Colorado Central.*—This line has been extended from Ralston northward 36 miles to Longmont, Col., and the *Floyd Branch* has been completed from Fork's Creek to Floyd Hill, 4 miles. *Chicago & Canada Southern.*—Extended from Blissfield northeastward about 40 miles to Grose Isle, Mich., completing a line 65 miles long from the Detroit River southwestward. *Worcester & Shrewsbury.*—This road, of 3-foot gauge, is completed from Worcester, Mass., eastward three miles to Lake Quinsigamond.

This is a total of 183½ miles of new railroad, making the total completed in the United States in 1873 2,691 miles.

Diameter of Wheel-Seat of Standard Car-Axle.

In last week's RAILROAD GAZETTE a correspondent, who signs himself "A Member," inquires by whose authority the wheel-seat of standard-axle was made 4½ inches diameter. We learn that this change was made by the Committee on Oil-Boxes and Journal-Bearings at their meeting in July. Whether the committee had the authority to do this or not we will not decide.

Erratum.

In an article published last week on "The Railroads and the Panic," a typographical error made us say that the population of the United States increases at the rate of 5 per cent. annually, instead of 2 per cent., in accordance with the facts. The article as it stands made it puzzling to understand how the increase could be so little as 6½ per cent. in three years.

RAILROAD BUILDING IN NEW JERSEY, under the general railroad law passed last spring, has not shown as much activity as was predicted, or as was generally expected. Not many companies have been organized, and, as far as we are informed, not a mile of track has yet been laid under the authority of the general law. With the exception of three or four, the companies thus far organized are mainly to build short local roads, or extensions of existing lines. The exceptions are the companies which proposed to build lines from New York to Phila-

delphia, and of these organizations, the National Company has thus far done nothing, and, indeed, seems likely to do nothing; the New Jersey Railway Company has made surveys, but appears to be waiting to see whether the National is carried through or not; of the latest company, which purposes building by way of Amboy and Camden, it is perhaps too soon to speak, although it appears to be in the hands of men who have been connected with many projected roads, and who have thus far been more distinguished for promises than for performance. Doubtless the same conditions which have caused less activity in railroad building in other parts of the country have produced the same effect in New Jersey; but it is true, too, that the State is already pretty well provided with railroads, and that short branches and extensions are the only lines likely to be needed for some years to come. As to a new line from Philadelphia to New York, the terminus of such a line must be on the Hudson opposite New York, and it is very difficult, indeed impossible, for any new road to reach the Hudson without the permission of some one of the existing companies. These companies control nearly the whole water front of Jersey City and Hoboken, and even if they had any room to spare they are not likely to give up any part of it to make room for a rival.

THE AMERICAN SOCIETY OF CIVIL ENGINEERS has recently received a condensed profile of the Lake Shore & Michigan Southern (which that company has recently had lithographed), and it is intimated that the Society and the profession would be much benefited if the engineers of other railroads would provide it with similar documents. Certainly they might be of great value to people out of the profession at certain times, and a collection of them is necessary to give a complete understanding of the railroad system of the country.

THE RAILWAY ASSOCIATION OF AMERICA will hold its next half-yearly meeting in Parlor No. 1 of the Grand Pacific Hotel, Chicago, beginning at 11 a. m. of Wednesday, the 8th inst. All presidents, vice-presidents and managing officers of railroads are invited to attend. We have heard that possibly a new plan of organization may be presented and discussed, and in this connection the sketch of the association which was formed in 1866, which we publish elsewhere, will be interesting.

NEW PUBLICATIONS.

Chimneys for Furnaces, Fire-Places and Steam Boilers. By R. Armstrong, C. E. (D. Van Nostrand, New York.)

This is the first number of the "Science Series" by this publisher, to which our attention was not called until after our notice of the second number. The book is a rambling sort of an essay on "chimneys" and we are compelled to say that we believe it of very little value. Reading it is like listening to a dull sermon; there is the constant feeling that it ought to contain some valuable information, but somehow the latter always evades the reader until the attention is exhausted and the book is laid aside as hopelessly dull. The book seems to be simply a plea for chimneys with a large internal sectional area, and with the exception of the directions to stokers at the end of the book, all the valuable information it contains could be condensed into a few paragraphs. It is evidently a reprint from some English publication, but we are not able to give its genealogy. The book we think unworthy of being the pioneer of the "Science Series" of the leading publisher of this class of works in this country.

Practical Designing of Retaining Walls. By Arthur Jacob, A. B. (New York. D. Van Nostrand.)

This is No. 3 of the publisher's "Science Series," and is a useful little manual. It gives the principles, formulae and tables for designing such works. These are in such a concise form as to be serviceable to the working engineer, which unfortunately cannot be said of all similar books. It contains, however, no information concerning foundations for retaining walls, which we believe is the part of their construction usually attended with the most difficulties. It is also a subject which it is impossible to study by an examination of existing works, as the foundations are always buried and inaccessible. A good treatise on retaining walls, which would include abutments and piers for bridges and, especially, give information concerning the manner of dealing with quicksands, boulders and other treacherous material, would be of very great value to many engineers, especially the younger members of the profession.

The "National Railway Association."

By the kindness of railroad officers who took part in the movement, we have been able to examine letters and records relating to an organization of American railroad companies which was made in 1866, and which held several meetings and mapped out for itself a good deal of important work. Although so recent, the movement is entirely unknown to a great many railroad men, and as there is now an effort to sustain an organization of similar character, a sketch of the rise and the decline and fall of the "National Railway Association" should be especially interesting.

The first document relating to this Association is the call for a "National Railroad Convention," to be held in Philadelphia, July 4, 1866, which is without date. This circular, which originated, we believe, with Mr. Isaac H. Sturgeon, at that time President of the North Missouri Railroad Company, says:

"The immense capital invested and being invested in railways renders this one of the most important interests in the country. It has been thought that a personal interchange of views between the chief officers of the railroads of the country, in regard to their construction, general management and operation, would be productive of much good to this interest; and with this object in view this convention is called."

"In such a convention an immense amount of valuable information will be imparted in regard to everything connected with railroad construction and management—improvements in machinery and rolling stock of all kinds, repairs of road, the

value of advertising and traveling agents, runners, and other expenses of that class, the reforms needed in the free-pass system, etc. It is hoped that the assembling of such a convention may result in establishing rules and imparting information that will save large sums of money both in constructing and operating railroads.

"One of the greatest benefits to result from the assembling of such a convention will be that the chief railroad managers from all parts of the country will become personally acquainted. Such a mingling of citizens from all parts of the Union can but be productive of great good in restoring harmony and good feeling among the people of our common country. It seems to us that the assembling of such a convention will go far toward obliterating the estrangements arising from the deplorable past, and in again uniting all for our whole country."

"The chief officers of the railroads in the British Provinces are invited to meet in this convention and take part in its discussions."

"All papers in the United States friendly to the assembling of this convention are requested to publish this call."

"The presidents, chief engineers and general superintendents of all railroads of the United States are earnestly invited to meet in this convention without further notice than seeing this call in the newspapers of the country."

This call was signed by twenty-seven presidents, ten general superintendents and two chief engineers, among them Mr. T. B. Blackstone, of the Chicago & Alton; Mr. Chester W. Chapin, of the Boston & Albany; Mr. Isaac Hinckley, of the Philadelphia, Wilmington & Baltimore; Mr. Benjamin H. Latrobe, then of the Pittsburgh & Connellsville; Mr. Gyles Merrill, of the Vermont Central; Mr. John Newell, then of the Cleveland & Toledo; Mr. J. Edgar Thomson, of the Pennsylvania, and Mr. Ashbel Welch, of the Camden & Amboy.

A letter from Mr. B. H. Latrobe, dated July 3, 1866, to a railroad president who was to attend the convention, proposed as important subjects for the consideration of the proposed association the resistance to an increase of the duty on railroad iron (with special reference to the enormous renewals then needed on Southern railroads), the best mode of establishing and operating through transportation lines over two or more connecting roads, a better standard of qualifications for the various executive officers of railroads, and uniformity of railroad signals.

The convention was held as called July 4 and 5, 1866, in Philadelphia. J. Edgar Thomson was President, Isaac H. Sturgeon (the President of the North Missouri), Vice-President and S. L. Fremont, of the Wilmington & Weldon, Secretary, and there were twenty-seven other railroad officers present on the first day, mostly from the East and South. On the second day fifteen more were present, mostly from the South.

At this meeting a memorial was adopted, praying Congress not to increase the duty on railroad iron, and a committee appointed to prepare business for the convention recommended the consideration of the following subjects:

"1. The abolition of the whole system of runners, commission on sales of tickets, and other irregular means of obtaining business. As this subject has been discussed at several meetings of the 'trunk lines' between the East and West, it is suggested that the resolutions adopted by them be considered by this convention."

"2. The abolition or very great reduction of free passes. One railroad company, acting alone, would find it difficult, if not impossible, to discontinue such passes; but if a 1 should unite, it would be easy for each. Free passes are a heavy tax upon the railroads, and disserve more people than they co-locate. Their discontinuance, your committee think, should be by the voluntary action of the companies—not by legislative interference."

"3. A respectful memorial to Congress, asking for compensation for carrying traveling post offices, and also additional compensation for ordinary mail service beyond the amount contemplated when the present prices were fixed. The actual cost of carrying each traveling post-office car one way cannot be less than \$75 per mile per annum, and no compensation for this can be obtained under existing laws. The ordinary matter carried on some routes is said to pay less freight per hundred pounds, transported at passenger speed, than ordinary first-class goods carried upon slow time."

"4. A further memorial to Congress to be prepared to secure the remission of taxes on gross receipts for freight, and to make a two-cent stamp sufficient on all railroad bills of lading, whether they are in their nature contracts or merely receipts. The five-cent stamp on each bill of lading, however small the amount of property, is a serious impediment to business. It is also desirable to obtain a remission or modification of the tax on repairs of rolling stock."

"5. A respectful memorial to the Postmaster-General, requesting him to discontinue such Sunday mails as, on the return of peace, the public interest does not now require that Sunday trains should be run; employees should have a day of rest, and the day kept in accordance with the moral sentiment of the community."

"6. An adjournment to meet at some future time (say at the St. Nicholas Hotel, New York, at noon on the third Wednesday in October next) and the appointment of committees, who shall receive any communications that may be offered on the following subjects, and report at said adjournment, viz:

"Signals and safety regulations.
"Permanent way and fixtures.
"Rolling stock.
"Expresses, fast freight lines and sleeping cars.
"Patents and patent laws.
"Fares and freights, including classification.
"Ticketing, and the amount of luggage to be allowed to each passenger, way-billing and checking.
"Circular letter of invitation to the adjourned meeting, enumerating the subjects referred to committees, etc."

Several inventions were referred to the committee for investigation; a committee was instructed to report on the expediency of such legislation as would enable the companies to connect the matter of insurance on passengers with a general policy for the benefit of disabled employees, and the convention adjourned, to meet in New York on the third Wednesday of the following October.

A circular dated July 16, 1866, gave the list of the subjects to be considered at the next meeting, with the names of the committees appointed by the Executive Committee to consider each. Among the committeemen appear the names of Benjamin H. Latrobe, R. B. Mason, John B. Jervis, T. B. Blackstone, Silas Seymour, Isaac Hinckley, Hugh Riddle, Warren Colburn, Dean Richmond, J. W. Garrett, Thomas A. Scott, C. J. Dryden, Wm. H. Vanderbilt, A. S. Diven, Amasa Stone, Jr., Onslow Stearns, George L. Dunlap, Ashbel Welch, John M. Douglas, Gyles Merrill, Charles F. Hatch, E. D. Williams, G. T. Beauregard, C. P. Huntington, Robert Harris, E. B. Phillips, Chester W. Chapin, Alexander Mitchell, D. C. McCallum,

Albert Fink, George Stark, Ginery Twitchell, John L. Jewett, Henry S. McComb, and many other eminent railroad men, most of whom, however, seem not to have been members of the association—if it could be called an association at that time.

A letter dated July 16, 1866, from Mr. Albert Fink, of the Louisville & Nashville Railroad, which we have had an opportunity of reading, presents some original and weighty suggestions. He would have a railroad bureau, consisting of three or four authorities on railroad matters, one in each department, whose sole duty should be to study railroad business and take care of railroad interests, and collect and distribute all information relating thereto. Mr. Fink estimated that such a bureau could be supported for \$35,000 per year, and that it would be the best investment the companies could make. "Every road now makes its own experiments at its own cost. Thousands of dollars are sometimes expended in introducing so-called improvements which have on other roads been proved a failure long ago. It would be the business of the Railroad Bureau to know the practical results of all inventions, and upon request to communicate them to those who desire information."

The October meeting was held as called at the St. Nicholas Hotel, New York, on the 24th and 25th of that month, at which Mr. Sturgeon, the Vice-President, presided in the absence of Mr. Thompson. Twenty-two railroad officers were present the first day and seven more the second day.

At this meeting the following resolution, offered by Mr. Ashbel Welch, was unanimously adopted:

"Resolved, That the general object of this convention is the improvement of railroad construction, maintenance and management, and that no action should be taken tending to isolate the railroad interest or place it in a position antagonistic to other interests, and that no subject should be entertained involving political, sectional, or similarly exciting discussions."

Messrs. Benj. H. Latrobe, D. C. McCallum, Albert Fink, Ashbel Welch and John B. Jervis were appointed a committee to consider the expediency of establishing a railroad bureau.

Mr. Ashbel Welch made an important report on "Signal and Safety Regulations," which was published in THE RAILROAD GAZETTE, on page 460 of Vol. II. (February 11, 1871). Mr. D. C. McCallum made a report on "Preserving Timber," in which attention was called to the Robbins and Hamar processes, Mr. Isaac Hinkley reported briefly on "Mail Service, Post-office Cars and Sunday Trains," and the Committee on Machinery and Patents reported that seven devices had been proposed to their attention, which they could not express an opinion on, but recommended the employment of experts to investigate such matters.

The following proposition was referred to a committee for consideration:

"The accidents that occur in persons attempting to get on trains after they are under way, the importance of having all the time of the conductor to attend to his train and the comfort of his passengers seems to make it important that all railroads should unite in adopting measures that would compel, as far as possible, the purchasing of tickets by persons before entering the cars, and to allow no one to attempt to get on or off the cars while in motion. This policy would save life, vexations, suits for damages, and secure the greater integrity of conductors."

The convention adjourned to meet at the same place on the second Wednesday of May, 1867, and the Executive Committee was instructed to urge committees to report at that meeting.

On the 29th of March, 1867, Mr. J. Edgar Thomson, the President, and Mr. Isaac H. Sturgeon, the Vice-President, issued the following circular over their signatures:

"The railroad companies of the United States are respectfully and earnestly requested to have themselves represented by one or more of their chief officers at the adjourned meeting of the National Railway Convention—which assembled for the first time on the 4th of July last, at Philadelphia, and again on the 24th of October last—at New York, at 12 o'clock on the 8th day of May, 1867. A committee was appointed at the October meeting to inquire into the best form in which a permanent institution devoted to the promotion of the common interests of the railways of the country could be established. That committee will make their report at the meeting in May, and it is in the highest degree desirable that there should be a full representation of the entire railway body. The necessity of such an institution for the protection and promotion of those interests in which all share alike, and which are aside from and above all rivalry between different members of the body, is becoming daily more apparent, and the time is fully come for its organization."

"This, and every matter that concerns railway interests, will be considered."

"If the chief officers of railway companies shall be so occupied with duties as not to be able to attend the convention, it is hoped that they will send a director of their company, with full power to act."

"The immense capital invested and being invested in railways seems to demand that they should assemble together and devise means best calculated to protect and advance railroad interests, and create a popular sentiment of a friendly character toward them."

"It is earnestly hoped that there will not be a single railway company in the United States unrepresented at this convention."

We have no record of this May meeting, except a printed constitution then proposed, which is interlined and added to by a committee which revised it for a following meeting. The constitution, as proposed at the May meeting, called the society the "National Railway Convention of the United States," and the preamble declared that "a periodical assemblage of the principal officers of the railway companies of the United States, and of the civil and mechanical engineers connected with its public works, will be greatly conducive to a free exchange of information and opinion upon all subjects of common interest to the internal improvement system of the country." The members were to consist of all railroad or canal officers not lower in grade than general freight or ticket agents, of the officers of companies manufacturing machinery for such works, and of civil and mechanical engineers engaged thereon. The society was to be supported by contributions from the companies, which the members, before joining, should be authorized to promise. Meetings were to be held in Washington in May and November. The officers were to be a president, secretary and treasurer, and an executive committee of seven, including the president and secretary, which was to meet quarterly, and was to be authorized to make investigations, collect statistics, examine new inventions, etc., the results of whose inquiries would be presented in the written reports of the executive committee to the Convention. The salaries of officers were to be fixed when the constitution should be adopted, and yearly thereafter.

This proposed constitution was referred to a committee at a meeting held in Philadelphia on the 5th of the following July. We have examined correspondence held on the subject, in which various suggestions were made by Mr. Ashbel Welch, Mr. John B. Jervis and Mr. R. D. Rice. The constitution was amended so as to change the name to "National Railway Association," make it a society of railroad companies, to be represented by such persons as they might appoint for the purpose, while civil and mechanical engineers might be chosen as associate members, having the right to debate but not to vote, and not subject to be taxed to support the Association. The Association was to be supported by contributions from the companies belonging to it, assessed one-half in proportion to mileage, and one-half in proportion to gross receipts. The meetings were to be held in Philadelphia instead of Washington, and annually instead of semi-annually. The working of the Association through an executive committee employing agents at its discretion was left as first proposed. Articles were added declaring the object of the Association to be improvement of railroad construction, maintenance and management, and prohibiting action tending to place the railroad interest in antagonism with other interests, or involving politics. No company with less than 20 miles of road could become a member, and each should have at least one vote and not more than five, but within these limits one for every hundred miles of road.

A circular from Mr. J. Edgar Thomson, the President, dated August 8, 1867, was sent out with this revised constitution, together with a letter signed by a committee appointed at an adjourned meeting of the convention held in Altoona, Pa., July 18, explaining its objects, a copy of which we have not seen. This circular also gave notice of an assessment of ten cents per mile of railroad to defray expenses.

A letter from Mr. Ashbel Welch, respecting this constitution, written December 3, 1867, says:

"The constitution settles a few principles and leaves forms and modes of proceeding to be varied from time to time as experience may show to be best. All the companies I have consulted are in favor of the thing; the difficulty is, no one has time to attend to it."

This is the last information we have of the "National Railway Association." Having been organized with some care and after much discussion, and on a basis which was almost unanimously adopted, and having the support of the leading railroad men of the East, it seems to have quietly disappeared; it died and made no sign. We imagine that the secret of its failure is given in the last sentence of Mr. Welch's letter above. All the companies were in favor of it, "the difficulty is, no one has time to attend to it." And we are inclined to believe that the successful working association, which is very much needed in this country, and might be productive of immense benefits, will be managed, and for the most part served, by officers who will have no other duties, but will be paid salaries by the associated companies, and give their whole time to the association.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

—Mr. W. D. S. Anderson, for some time in the Auditing Department of the Chicago & Northwestern, and for two or three years past in the General Ticket Office of the Vandalia Line, has accepted a position as Chief Clerk in the Freight Department of the Houston & Great Northern.

—At the annual meeting of the Toronto & Nipissing Railway Company in Toronto, Ont., Sept. 9, the following board of directors was elected: William Gooderham, Jr., A. T. Fulton, J. E. Ellis, Wm. Copland, H. McDonald, H. P. Dwight, Joseph Gould, George Gooderham and W. S. Lee. The directors subsequently elected Wm. Gooderham, Jr., President, and A. T. Fulton, Vice-President.

—At the annual meeting of the Cincinnati & Terre Haute Railroad Company, in Terre Haute, Ind., September 23, the following directors were chosen: L. A. Burnett, Terre Haute, Ind.; James B. Foley, Greensburg, Ind.; James Small, Bloomington, Ind.; John D. Scully, Pittsburg, Pa.; C. F. Betts, L. D. Brim, H. C. Thomson, New York. Messrs. Brim and Thomson are new directors, replacing Alfred Pleasanton and H. I. Hubbard. The board subsequently elected the following officers: President, L. A. Burnett; Vice-President, James B. Foley; Secretary and Treasurer, A. B. Quackenbush, Terre Haute, Ind.

—Mr. Stephen Lightcap has been appointed Train Dispatcher at Chambersburg, Pa., on the Cumberland Valley Railroad, in place of Henry Elliott, resigned. Mr. Lightcap has been for some time a conductor on the road.

—Mr. Louis Blankenhorn, late in the Auditor's office of the Southern Minnesota Railroad, has been appointed Accountant in the Auditor's office of the International & Great Northern road at Houston, Tex.

—Mr. C. W. Winslow has been appointed General Accountant of the Canada Southern Railway Company.

—Mr. Frank Milligan, formerly General Freight and Ticket Agent of the Detroit, Eel River & Illinois Railroad, has been appointed Contracting Agent for the State of Michigan of the freight department of the Great Western Railway of Canada. His office is at Detroit, Mich.

—Mr. H. A. Blood, late General Superintendent, has been appointed General Manager of the Boston, Clinton & Fitchburg Railroad and its leased and controlled lines, comprising the Fitchburg & Worcester, Mansfield & Framingham, Framingham & Lowell, Nashua, Acton & Boston, Taunton Branch and New Bedford railroads. Mr. Scott A. Webber, late General Freight Agent, has been appointed Superintendent of the Boston, Clinton & Fitchburg road.

—Mr. R. E. O'Brien, who has been Chief Engineer and Superintendent of the Atlantic & Great Western Railroad Company, has been appointed Second Vice-President, assuming that position September 1.

—Mr. Samuel S. Blair, for 13 years past Superintendent of the Baltimore Division of the Northern Central Railway, has

been appointed Superintendent of the Tyrone Division of the Pennsylvania Railroad.

—Mr. George C. Wilkin has been appointed Superintendent of the Baltimore Division of the Northern Central Railway, in place of Samuel S. Blair.

—Mr. S. Farnsworth is Eastern Passenger Agent of the Toledo, Wabash & Western Railway, with office at Worcester, Mass.; Mr. J. S. Lazarus is Western Passenger Agent, with office at Kansas City, Mo.

—Mr. William H. Brown has been appointed Auditor; J. C. Hadley, General Freight Agent, and Walter C. Hobbs, General Ticket Agent of the Logansport, Crawfordsville & Southwestern Railway, in place of J. E. McGettigan, who held all three offices.

—Mr. T. A. Walker, Selma, Ala., and Hon. John Tucker (President of the company), New York, are receivers of the Selma, Rome & Dalton Railroad.

—Mr. J. Brandt, Jr., recently Superintendent of Motive Power, has been appointed Superintendent of the Oregon & California Railroad, in place of J. C. Hildreth, resigned.

—Mr. Robert Martin has been appointed Secretary and Treasurer of the Port Royal Railroad Company, in place of H. H. Thayer. Mr. W. W. Thomas has been appointed General Freight and Ticket Agent, in place of W. H. Kirk.

—Mr. H. S. Hangan has been appointed Auditor and Treasurer of the Southern Minnesota Railroad Company, in place of B. G. Lennox, resigned. Mr. J. K. Brown has been appointed Land Commissioner, in place of M. Conant. Mr. James Waters has been appointed Master Mechanic, in place of W. Lining.

—Mr. O. G. Murray has been appointed Assistant General Freight and Ticket Agent of the Galveston, Houston & Henderson Railroad, with office at Galveston, Texas.

—Mr. Ira A. Evans has been appointed Secretary of the International & Great Northern Railway Company, in place of Robert Avery.

—Mr. J. B. Washington has been appointed Assistant Auditor and Secretary of the Pittsburgh, Washington & Baltimore Railroad Company. Mr. S. C. Hough is General Passenger Agent, with office at Pittsburgh, Pa. Mr. L. M. Cole is General Ticket Agent, with office at Baltimore. Mr. G. B. Hathorn has been appointed Assistant General Freight Agent, in place of C. A. Chipley, resigned.

—Mr. D. E. Maxwell, Assistant Superintendent, has been appointed also General Freight and Ticket Agent of the Atlantic, Gulf & West India Transit Company's (formerly the Florida) Railroad. His office is at Fernandina, Fla.

—Mr. C. A. Chipley has been appointed agent of the freight department of the Baltimore & Ohio Railroad at Boston, Mass.

—Mr. H. P. Alden is General Superintendent of the Canada Central Railway. Mr. T. A. McKinnon is Local Superintendent, and H. A. Alden Mechanical Superintendent. The offices are at Brockville, Ont.

—The officers of the newly organized Union Railroad Company of New Jersey are as follows: President, Peter Bendley, Jr.; Treasurer, Gardiner S. Kimball; Secretary, John P. Culver; Chief Engineer, J. B. Culver; Attorney and General Manager, Johnson D. Banghart.

PERSONAL.

—Mr. Henry Elliott, Train Dispatcher at Chambersburg, Pa., on the Cumberland Valley Railroad, has resigned, and will take charge of a hotel at Chambersburg.

—Mr. E. C. Dawes has retired from the office of General Superintendent of the Logansport, Crawfordsville & Southwestern Railway. Mr. J. H. Paris has resigned the office of Secretary, and J. H. Elston that of Treasurer of the company.

—Colonel W. E. Faulkner, for many years a director of the Fitchburg Railroad Company, died at his residence in Acton, Mass., September 27.

TRAFFIC AND EARNINGS.

—The earnings of the Chicago & Northwestern Railway for the third week in September were: 1873, \$352,344; 1872, \$316,295; increase, \$36,049, or 10 1/2 per cent.

—The earnings and expenses of the Northern Central Railway for the eight months ending August 31 were as follows:

	1873.	1872.	Increase.	Per cent.
Gross earnings.....	\$329,661.33	\$287,374.05	\$42,287.28	15 1/2
Expenses.....	2,470,794.12	2,257,321.31	213,472.81	9 1/2
Net earnings.....	\$818,867.11	\$590,052.64	\$228,814.47	37 1/2

The percentage of expenses to earnings in 1873 was 75 1/2 per cent, and in 1872, 79 1/2 per cent. The gross earnings per mile were \$9,206 in 1873, and \$7,976 in 1872.

—The shipments of through freight east from San Francisco over the Central Pacific in August were 3,461 tons and from interior points 366 tons, making in all 3,827 tons or 382 carloads. The principal items were: wool, 1,245 tons; tea, 811 tons; fish, 304 tons; skins, 261 tons; wine, 216 tons.

—The earnings of the Connecticut Western Railroad for the year ending August 31 were as follows:

Passengers.....	\$115,770.27
Freight.....	234,701.05
Milk.....	10,478.55
Mail.....	3,500.00
Express.....	3,500.00

Total (\$5,411 per mile) \$367,960.87
The road extends from Hartford, Conn., west by north to Millerton, N. Y.

—The earnings of the Indianapolis, Bloomington & Western Railway for the third week in September were: 1873, \$19,269; 1872, \$35,209; increase, \$14,059, or 40 per cent.

—The earnings of the Grand Trunk Railway of Canada for the week ending September 13 were: 1873, \$43,600; 1872, \$41,200; increase, \$2,400, or 5 1/2 per cent.

—The earnings of the Great Western Railway of Canada for the week ending September 12 were: 1873, \$28,553; 1872, \$23,618; increase, \$4,935, or 20 1/2 per cent.

—The earnings of the Erie Railway for the third week in September were: 1873, \$530,366; 1872, \$468,744; increase, \$61,622, or 13 1/2 per cent.

—The earnings of the Grand Trunk Railway of Canada, for the week ending August 6 were: 1873, \$40,400; 1872, \$38,200; increase, \$2,200, or 5 1/2 per cent.

—The earnings of the Kansas Pacific Railway for the second week in September were: passengers, \$32,412.90; freight, \$42,931.81; mail, \$2,055.31; total, \$77,400.02. Of this amount, \$2,872.64 was for transportation of troops, mails and government freight.

—The earnings of the Denver & Rio Grande Railway, main line, for the second week in September were: 1873, \$6,756; 1872, \$5,484; increase, \$1,272, or 23 1/2 per cent.

—During the year ending Aug. 31, 1873, the receipts of cotton at St. Louis were 59,709 bales, of which 33,132 bales came by rail and 26,577 by river, against 6,493 bales by rail and 30,018 by river (a total of 36,421) the previous year. The principal receipts by rail were 17,223 bales by Missouri, Kansas & Texas, 11,830 bales by St. Louis & Iron Mountain and 3,743 bales by Atlantic & Pacific. The shipments for the year were

51,795 bales—896 bales by river, 50,899 bales by rail. Of the latter the Toledo, Wabash & Western carried 23,047 bales; the Ohio & Mississippi, 12,344 bales; the Vandalia Line, 10,384 bales, and the Indianapolis & St. Louis, 3,778 bales.

—The earnings of the Denver & Rio Grande Railroad for the week ending September 21, 1873, were: passengers, \$4,033.95; freight, \$3,768.04; mails, \$123; express and miscellaneous, \$83.08; total, \$8,008.07. Of this amount, \$199.40 was for transportation of troops and mails. The earnings for the same week in 1872 were \$7,358.48; increase, \$649.59, or 9 per cent. In 1872 the earnings included \$1,418.79 for contractors' freight.

CHICAGO RAILROAD NEWS.

The Chicago Exposition.

This opened on Thursday evening of last week, with good promise of turning out a financial success, notwithstanding the unfortunate coincidence of the financial panic, which reached its maximum, as is hoped, at the same time. The railroad companies centering in this city will issue excursion tickets at various times during the continuance of the exposition, and over various stations of their lines. The Chicago & Alton road issue tickets at one and one-fifth the usual fare, good between Chicago and Dwight, September 30, to return next day, and between Washington and Macon and all intermediate points, October 1, and on October 6, excursion tickets between Dwight and Macon City and all intermediate points. The Chicago, Burlington & Quincy road issued excursion tickets over a portion of their road for Wednesday, October 1, and the Illinois Central all excursion tickets for October 6 and 7, good for return until October 9; also on October 8 and 9, good until October 12, and on October 22 and 23, good until the 26th of the month. The other railroad lines will issue similar excursion tickets, but the dates have not yet been fixed, the object being to scatter visitors along so as not to cause a jam at one time and a paucity of visitors at another.

Effect of the Panic.

The ill effects of the recent panic have operated very plainly upon the railroad companies. Their freight receipts have fallen off remarkably, and the decrease of passenger traffic is very plain. It has stopped all construction, except such as was absolutely necessary for the running of the roads, and the trainmen, have been reduced in some instances very decidedly. The Chicago & Northwestern road has already discharged nearly a thousand men, engaged mostly in the work of construction. The Illinois Central cut off half an hour from the time of their men, beginning October 1st. The panic has almost entirely stopped the shipment eastward by rail of grain or stock. Parties are beginning to offer to ship grain by lake (on which rates are at least a third lower than before the panic), waiting for their freight until the grain is sold. Shippers cannot get money to pay their own freight, and the railroad companies are, as far as possible, carrying the freights until returns from sales at the East can be made. Even the grain that is already sold in the country on options and which ought to be arriving is largely detained at the places of production, simply because it is utterly impossible for the buyers to take it and pay for it. But this state of things can hardly continue long. There is plenty of grain in the West, and the money for its purchase must be forthcoming before long. The Lake Shore & Michigan Southern Company still continues the work of constructing its double track, and it is of so much importance that it will probably not be stopped in any event. But the projected roads toward the West are all practically stopped, and no more new road will be constructed so long as the market for bonds is so bad.

Michigan Central.

This company completed a section of steel second track eight miles in length, immediately west of Buchanan Station, and opened for traffic September 28. In about three weeks another section, four miles in length, will be completed, which will be the last work completed this fall.

Chicago & Alton.

The following circular has been issued from the General Freight Office to agents and stock shippers with regard to passing men in charge of live stock:

"From and after October 1, 1873, the following rules will govern the passing of men in charge of live stock and their return:

"On shipment of horses, mules, cattle and sheep, belonging to one owner, shippers will be passed on freight trains on stock contracts as follows:

- "One (1) man with two (2) or three (3) cars.
- "Two (2) men with four (4) to seven (7) cars.
- "Three (3) men with eight (8) cars or more.
- "Which is the maximum number that will be passed with stock for one owner.

"On shipment of hogs only one man will be passed with any number of cars.

"The agent of the station where the stock is loaded will enter on the back of the contract, in ink (and erase with ink the space not used), the name or names of persons who are actually entitled to pass free with stock, which is the authority of the conductor to pass them.

"Names entered in pencil will not be accepted by conductors. When no person is in charge, erase all the space on the back of the contract. Agents will refuse to enter any names on the contract but those of the owner or employees in charge of the stock without regard to passes required by number of cars.

"It is understood that shippers are passed on freight trains to take care of their stock, and stock contracts, except to return, consigned as below, are not good on passenger trains.

"Return passes, good on passenger trains, will be given on stock contracts only, and will not be accepted unless countersigned and stamped by the assistant general freight agent, Chicago, or, on shipments to East St. Louis or Venice, by the general agent at St. Louis or East St. Louis, or freight agent at East St. Louis or Venice.

"Return passes will not be given on contracts unless presented within ten days from their date; and return passes will only be good when used within ten days from date."

This has been spoken of as a return to the pass system. But the passes so provided for are simply a bonus for freight shipments, given on definite terms and for a specified consideration.

The Senate Transportation Committee.

This Committee has been in session in this city the last days of last week and heard various parties interested in transportation. Among them was the Chairman of the Board of Railroad and Warehouse Commissioners, Colonel Cook. He said that he believed the capital accounts of the roads, which are at the average rate of \$12,000 per mile, to be much greater than the cost of the properties, which he thinks is more nearly \$22,000 per mile, which statement indicates that Colonel Cook can have very little accurate knowledge on the subject. He can have all the contracts he wants for constructing railroads equal in quality and equipment to the average of Illinois railroads at a great deal more than \$22,000 a mile, and then lose several thousands of dollars per mile. As there is no other country in the world where railroads have so light capital accounts, it seems a little strange that here more than anywhere else complaints should be made that they are too great. He also said that the history of railroads in Illinois showed that freight charges increase as the country is developed, the

fact being that such charges have decreased greatly, almost constantly, since the war, and on the whole have decreased very much more than the prices of produce and manufactures, or of any other service. He also said that the Commissioners believed the rate on freight shipped from or to points outside of the State to be subject to regulation by the State law, in which the Commissioners differ from the lawyers. Mr. J. M. Walker, of the Chicago, Burlington & Quincy, said that the cost of carriage on his road was at the rate of 1.3 cents per mile, without making any allowance for dividends and interest on the bonded debt. He thought the produce of Illinois was carried for one-third less than that of England, Germany or France. Only 4 out of 50 Illinois lines paid any dividends. He believed that railroads should do themselves the express, fast-freight and sleeping-car business on their own lines. Mr. Sargent, of the Michigan Central, and Mr. Newell, of the Illinois Central, also gave testimony as to the price and cost of transportation on their roads, the probable value of St. Lawrence and Mississippi canals, freight roads to the East, etc.

OLD AND NEW ROADS.

Improvement of Red River.

For some time past operations have been going on for the removal of the raft in the Red River above Sireport. This raft consists of an immense accumulation of driftwood in the river. Attempts have been made to remove it from time to time with only partial success. The present operations, however, are being systematically conducted and promise to result in opening the river. The so-called raft is not continuous, but is in sections, where the drift has gathered round snags and other obstructions, and between the rafts there are stretches of clear water. These rafts are cut into by a flat boat constructed for the purpose, and furnished with all the requisite tools. In many places gunpowder has to be used to break up the accumulation of drift. Thus far four miles of raft has been removed, clearing a much greater distance on the river. Three miles of raft remains to be removed. The appropriation of \$80,000 made by Congress last winter will be sufficient to finish the work now in hand; but to make it complete and prevent the renewal of the raft, it will be necessary to remove collections of driftwood and overhanging trees of at least 100 miles up the river, which will require an additional appropriation. The removal of the raft will open up navigation to a large and fertile section of country.

Pacific of Missouri.

In the case of this company against Cass County and others, the Supreme Court of Missouri has decided that the real property of the company was not exempted from taxation for county purposes under the law, and that a county tax could be levied in addition to the State tax. In the particular case in question, however, it was decided that the assessment was not made legally and in due form by the county officers, and was consequently void. With respect to the rolling stock, which is personal property, the court decided that the legal domicile of the company must be held to be in St. Louis, and its personal property must be taxed in that county, and consequently no tax could be levied on it in any other county.

Boston & Lowell.

This company paid October 1 the scrip dividend issued in 1867, and the old certificates were surrendered at that time. The amount of the scrip was \$366,000. The scrip was issued January 1, 1867, and endorsed on the certificates of stock at that time to "represent the accumulations of the Sinking Fund on the bonds of 1873." Stock issued since January, 1867, was called "new," and did not carry the extra dividend. Dividends have been paid on this scrip the same as on the stock. From October 1, the old and new stock will stand alike.

Union.

A company by the name of the Union Railroad Company was organized in Jersey City, N. J., September 29. The company intends to build a railroad from Newark to the Delaware River and thence to Philadelphia. It is proposed to take the line surveyed by the National Company and also what grading was done by that company. This, however, is really very little, as the work done last year was so managed as to make as much show with as little work as possible. The new company is probably an attempt to reconstruct the National Railway Company, which latter is, owing to internal dissensions, not likely to do anything. Whether the new company will be more successful remains to be seen.

Union Pacific.

The flooring of the bridge over the Missouri at Omaha was set on fire September 26 by a passing train, and some 300 feet of the woodwork destroyed. The damage was repaired the same night and trains passed over the bridge as usual the next day.

Boston, Clinton & Fitchburg.

The keels have been laid for two new steamers for this company's line between New Bedford, Mass., and New York. The steamers, which are to be called the City of New Bedford and the City of Fitchburg, will be of 1,100 tons each. They are to be used for fast freight and passenger travel, the steamers now on the line being retained for heavy freight work. The new steamers are to be completed in April, 1874.

Dividends.

A semi-annual dividend of 3 per cent. on the stock of the Lowell & Lawrence Railroad Company will be paid October 7.

The regular semi-annual dividend of 4 per cent. on the preferred stock of the Ogdenburg & Lake Champlain Railroad Company was paid October 1.

New Mail Route.

Mail service has been ordered over the Milwaukee Division of the Burlington, Cedar Rapids & Minnesota road from Independence, Ia., to Postville, 54 miles. The compensation is not stated.

Chicago & Canada Southern.

Trains have commenced running on the Chicago & Canada Southern, from Grosse Ile, Mich., southwest to Fayette, Ohio, the present western terminus, about 65 miles. The track from Blissfield, Mich., to Fayette was laid last year, but was not operated until the completion of the section from Blissfield to Grosse Ile, which is about 40 miles long. The stations on the line are: Grosse Ile, Trenton, Flat Rock, Briar Hill, Carlton, Exeter, Maybee, North Raisinville, Summit, Petersburg, Deerfield, Blissfield, Ogden, Fairfield, Weston, Morenci, Fayette. Trains have also commenced running on the Toledo, Canada Southern & Detroit road.

Milwaukee & St. Paul.

The application for an injunction to restrain this company from proceeding with the construction of the bridge over the Mississippi above La Crosse, Wis., came up before the United States Circuit Court at La Crosse, Sept. 18. After hearing argument for two days, the court decided to grant the injunction, and the company is accordingly restrained from going on with the work. In the opinion delivered by the court, it is held that while, under the existing law, the Secretary of War has not the right to locate the bridge, he has a right to disapprove

of a location made by the company, and a bridge cannot be constructed at any point which he may disapprove.

The company claims that the Secretary of War has no right to disapprove their location unless a bridge at that point should interfere with navigation. It is said that the company will make all possible preparations to continue work on the bridge and will carry the work on as far as possible, trusting to its ability to obtain further legislation on the matter from Congress at its next session.

Colorado Central.

The extension, or branch, of this road from Golden, Col., northward is open to Longmont, 41 miles from Golden, and trains are running to that point. This branch leaves the line from Denver to Golden at Golden Junction, two miles east of Golden.

A branch of the narrow-gauge line (Golden to Black Hawk) has been built from Fork's Creek, 14 miles west of Golden, to Floyd Hill. This branch is four miles long. The total length of road now in operation is 81 miles.

Paducah & Memphis.

Trains are now running regularly to Trimble, Tenn., 78 miles south of Paducah, Ky., and four miles beyond the last point noted. This, with the 37 miles of track now laid from Memphis northeast to Covington, makes altogether 115 miles of the road completed.

The Paterson Locomotive Shops.

The Rogers Locomotive Works have discharged altogether 1,000 men, or about two-thirds of the working force.

The Grant Locomotive Works will shortly discharge 175 men, mainly from the boiler shop, smith shop and foundry.

The Danforth Locomotive Works have also, it is stated, discharged 100 men.

Railroads in Chili.

The Chilean Congress has recently passed a bill authorizing the Government to spend \$2,700,000 in the purchase of new rolling stock for the Southern Railroad, and another bill authorizing the purchase of the stock in that line now held by private individuals.

Clark & Co., contractors, have presented a petition to Congress stating that the railroad across the Andes in the province of Aconcagua, to connect with the line from Buenos Ayres by way of Mendoza, will cost \$26,000,000; that there are only two practicable routes, one by Uspallata, which will require a tunnel 5,000 metres (5,470 yards) long, and one by Los Patos, which will require a tunnel of 3,000 metres (3,280 yards), besides extensive snow-sheds. They therefore ask Congress to substitute for a guarantee of bonds a yearly grant of \$1,500,000 in 6 per cent. bonds with a sinking fund of 1 per cent., they binding themselves to pay the above interest whenever the profits of the road shall exceed 6 per cent. on the capital invested. The grant to be paid at the end of each year, after examining the company's yearly balance, the contractors to be allowed their just share. Whenever the profits of the road shall exceed 7 per cent. on the capital, such excess shall be applied to the repayment of the Government grant. Congress has not yet acted on the petition.

Worcester & Shrewsbury.

The Western half of this road from Worcester, Mass., east to Lake Quinsigamond, a distance of three miles, is now completed and in operation. The road is at present operated by a steam car, or dummy, but locomotives and other rolling stock will probably soon be put on. The highest grade on the line is 160 feet to the mile. The road is of 3-foot gauge, and is the first narrow-gauge road in New England. Messrs. Buttrick and Wheeler are the engineers, and Leach & Wellington are the contractors for the construction of the road.

International & Great Northern.

A meeting of the stockholders of the International Company was held in Palestine, Tex., September 24, and one of the stockholders of the Houston & Great Northern in Houston, Tex., September 27, to consider a plan for a complete consolidation of the two companies, to replace the present partial consolidation.

Ohio & Lake Michigan.

A meeting of the stockholders of this company, which has been constructing the Michigan section of the Mansfield, Coldwater & Lake Michigan road, was held in Coldwater, Mich., Sept. 22, to receive the report of an investigating committee appointed at a previous meeting. The committee reported that the subscriptions to the stock of the company amounted to \$511,100, of which \$479,100 was paid in. Of this there had been expended for engineering about \$17,000, for right of way about \$50,000, for miscellaneous expenses about \$11,000, and paid to S. C. Rose & Co., the contractors, about \$400,000, making in all \$478,000. In 1871 there was voted to the directors \$800 per month, payable in stock of the company, as salary for all time spent in labor for the road. Nearly all the directors have received this stock, but none of them have had any other compensation, except for actual traveling expenses.

The Michigan section of the line is nearly all ready for the iron, and some work is now being done on it. The delay in completing the road is charged to the Mansfield, Coldwater & Lake Michigan Company. This latter company has, it is charged, failed to keep its contracts with the Pennsylvania Company, and has generally failed to keep its promises.

New Jersey Midland.

An arrangement has been made between this company and Mr. Abram Hewitt, Receiver of the New York & Oswego Midland Railroad, which is to take effect September 30, provided it is approved by the United States Circuit Court, under whose orders Mr. Hewitt acts. The Receiver being unable to pay the \$2,000 per day in liquidation of the floating debt of the New Jersey Midland, as required by the recently-made lease, that lease is temporarily set aside. The New Jersey Midland Company will take and operate that portion of its road from Jersey City to Pompton Junction, while the Receiver will continue to operate the section from Pompton Junction to Unionville (39 miles) paying therefor a rent of \$580 per day. Through trains will run over the New Jersey Midland or the Montclair east of Pompton Junction, as the Receiver deems best, he paying trackage for all cars run over the Midland. It is also agreed that a sufficient number of local trains shall be run over the section of the road under his control. The agreement is to be terminable on 30 days' notice, provided the receipts are not sufficient to pay the rent. In that case the New Jersey Company will resume possession of the whole road.

Mr. Hewitt agrees to loan the New Jersey Midland, at a fair compensation, what rolling stock it needs, as that company has very little of its own.

The rent is at the rate of \$211,700 per year. The distance from Pompton Junction to Unionville is 39 miles, so that the rent is at the rate of \$5,428 per mile for the least productive portion of the road.

Welland Canal.

The Department of Public Works of the Dominion of Canada invites proposals for the construction of 14 locks, 14 regulating weirs and a number of bridge abutments and piers, and the excavation of the lock and weir pits and the intervening raceways and reaches on the new portion of the Welland Canal between Thorold and Port Dalhousie. The work is to be let in nine sections. Proposals are also asked for enlarging and deepening the prism of the present canal between Port Robinson and the

has been made with a finished section of the road which extends from Manitowoc west by north to Appleton, 43 miles, making the whole length of the road 120 miles. It was to be leased and operated by the Wisconsin Central, but it has been reported that this arrangement is abandoned.

Wisconsin Valley.

Grading is going on rapidly on the extension northward from Grand Rapids, Wis., and the track will soon be laid to the crossing of the Wisconsin Central, some 15 miles from Grand Rapids. Side tracks are being laid to several sawmills along the river. It has been resolved not to turn eastward to Stevens Point, but to build on the original line, which is nearly direct from Grand Rapids to Wausan, crossing the Wisconsin River at Knowlton.

Utah Northern.

Tracklaying from Logan, Utah, northward has been commenced, and the work is to be pushed through to Smithfield, eight miles beyond Logan.

Wasatch & Jordan Valley.

The track is now laid to Fairfield's Flat, 12 miles from the junction with the Utah Southern at Sandy, and 5½ miles beyond the late terminus at Granite. On the line between Granite and Fairfield's Flat the ascent is very rapid, there being one short grade of 287 feet to the mile, and about three miles with a grade of 250 feet to the mile. About half way between the two places a back switch 1,400 feet long had to be put in to obtain the required elevation. No work will be done beyond Fairfield's flat until next season. The road is of three-foot gauge.

Texas & Pacific.

Track on the Transcontinental Division is now laid two miles beyond Bonham, or 29 miles eastward from Sherman, and seven miles further than at last accounts. Several miles of iron have been sent from Sherman for the use of the tracklayers on the Jefferson Division.

On the Jefferson Division, track is laid 38 miles northward from Jefferson and seven miles beyond Atlanta, the last point noted. A number of new towns are being laid out on the Jefferson and Transcontinental divisions.

The telegraph line from San Diego, Cal., eastward, is up for 23 miles, and is being rapidly extended. It is expected to be completed to Fort Yuma, in Arizona, 200 miles, early in November.

Camden, Gloucester & Mount Ephraim.

The line of this road has been located, and work is to be commenced at once. It is intended to have the road completed from Camden, N. J., to Gloucester City, four miles, this fall.

Delaware Shore.

Of the \$100,000 required to be raised in stock subscriptions \$80,000 has been raised, and the amount is increasing. It is hoped that work can be commenced this fall.

New Jersey Southern.

Work has been commenced on the new wharves and ferry-house at Bayside, N. J., the southern terminus of the road.

Dunning's Creek.

This line is now completed and was opened for business October 1. It has been built by the Pennsylvania Railroad Company and is a branch or extension of the Bedford Division from Bedford, Pa., northward 11 miles to Holderbaum's. The road passes through extensive deposits of iron ore and is expected to do a considerable business in the transportation of ore. The station on the line are Bedford, Chalybeate Springs, Yont's, Cessna, Hughes, Sil's and Holderbaum's. The road has been built under the supervision of Mr. W. H. Brown, Superintendent of the Bedford Division, Pennsylvania Railroad.

Manhattan & Northwestern.

The township of Manhattan, Kan., which voted \$35,000 in bonds in aid of the road, has voted to extend to November 30, 1874, the time for the compliance with the conditions on which the bonds were voted. This is done in consequence of difficulties experienced by the company in securing iron for the road.

Cairo & Fulton.

Work on the pile-driving for the trestle across Adam's Lake and Swan Lake, on the extension from Fulton, Ark., to Texarkana, has been commenced. The first trestle will be 900 and the second 800 feet long.

Cairo & Vincennes.

The Cairo (Ill.) Bulletin of recent date says: "General Burnside is, we understand, to be left in undisturbed possession of the Cairo & Vincennes road. General Winslow has requested his friends to do all they can to maintain discipline among the employees."

Louisiana Bridge.

The work on the bridge over the Mississippi at Louisiana, Mo., is now going on night and day. Two piers are completed and the pivot pier is to be finished by October 15. It is said that the bar in front of Louisiana has changed so that steamboats have great difficulty in passing the piers of the bridge.

Des Moines Valley.

Under the special execution for the sale of this road issued by the court the road is to be sold October 17, and George B. Smyth, of Keokuk, Ia., is appointed receiver. The road is now in his possession, and will so remain until after the sale.

Quincy, Alton & St. Louis.

This company has leased the shops at Quincy, Ill., which were lately vacated by the Chicago, Burlington & Quincy road. The necessary tools have been ordered and will soon be put in. The company purposes making repairs for other roads running into Quincy, as well as for its own road.

Baltimore & Ohio—Straitsville Division.

Surveys have been made for an extension of this line from its present southern terminus at Shawnee, O., down Snow Fork to a connection with the Marietta & Cincinnati road near Athens, a distance of about 20 miles, and it is said the extension will soon be built.

Davenport & St. Paul.

Regular trains began running to Fayette, Ia., 129 miles northwest of Davenport, October 1. The depot at that place is being rapidly put up.

Cairo & Fulton.

The Secretary of the Interior has appointed Richard Yates and George H. Hurlburt, of Illinois, and John Frew, of Ohio, commissioners to examine and report on the new portion of the Cairo & Fulton road from Little Rock to Fulton, and also the section of 25 miles southwest from the Missouri State line.

Cincinnati, Lafayette & Chicago.

This company has commenced the erection of a new passenger and freight depot and a round house at Kankakee, Ill.

Belvidere & Ottawa.

This company was organized at a meeting of subscribers to the stock, held at De Kalb, Ill., September 20. The charter for the road was granted in 1867 and contemplated a road from Belvidere, Ill., southward to Ottawa, but it is now proposed to build from Belvidere, which is on the Galena Division of the Chicago & Northwestern, 78 miles from Chicago, south by east to the Fox River near Seneca, 30 miles southwest of Aurora, if proper arrangements can be made for a connection

LOCOMOTIVE RETURNS, MAY, 1873.

Master Mechanics of all American railroads are invited to send us their monthly reports for this table.

NAME OF ROAD.	Number of Locomotives in service.	Number of miles operated.	MILEAGE.			No. of Miles RUN TO Ton of Coal.	COST PER MILE, IN CENTS.					AVERAGE COST OF			
			Passenger.	Freight.	Miscellaneous.		Coal.	Oil.	Wool.	per gallon.	per ton.	per car.			
Allegheny Valley.....	56	37,715	109,302	14,700	160,717	38.60	20.20	6.55	5.68	1.00	3.15	21.38	\$	\$	
California Pacific.....	143	11,496	5,285	3,415	24,196	50.41	23.56	10.68	9.92	0.68	5.82	27.08	2.00	2.70	
Central Pacific (Western Division).....	173.4	41,359	44,110	31,600	117,609	47.14	15.52	11.10	11.57	0.85	6.35	35.88	3.35	3.94	
Central Pacific (Sacramento Div.).....	119.5	38	13,734	46,094	32,100	91,948	28.98	15.66	11.08	11.87	0.90	7.35	34.30	4.34	
Central Pacific (Truckee Div.).....	134.5	27	14,835	43,257	19,100	71,232	34.94	49.58	13.51	10.96	21.74	1.03	7.32	41.05	
Central Pacific (Humboldt Div.).....	336.6	15,351	39,432	6,875	61,638	33.28	11.31	14.70	21.63	0.96	7.08	44.37	8.31	3.94	
Central Pacific (Salt Lake Div.).....	182.8	27	12,140	62,575	10,659	85,374	39.47	12.09	9.51	20.97	0.94	6.84	31.23	4.34	
Central Pacific (Oregon Div.).....	131.48	7	11,979	7,933	19,799	41.23	23.93	5.20	10.53	0.55	6.03	23.11	4.24		
Central Pacific (Wasatch Div.).....	146.3	9	10,540	6,600	3,615	20,755	58.51	19.56	5.29	14.12	0.69	6.90	27.00	8.33	3.44
Chicago, Burlington & Quincy.....	285	76,907	87,245	52,400	216,552	30.89	13.92	7.88	7.83	0.66	9.02	25.52	3.60	4.23	
Chicago & N. W. (Wis. & Ill. Div.).....	16	11,021	26,205	11,007	48,321	33.75	6.96	12.07	0.74		7.99	27.68	3.50	4.75	
Chicago & N. W. (Madison Div.).....	16	11,021	26,205	11,007	48,321	33.75	6.96	12.07	0.74		7.99	27.68	3.50	4.75	
Chicago & N. W. (Galena Div.).....	79	49,073	98,018	59,161	206,244	35.12	12.57	10.54	0.92		8.99	32.81	3.50	4.75	
Chicago & N. W. (Iowa Div.).....	76	53,200	86,551	21,606	171,647	31.34	8.94	11.53	0.92		9.61	31.00	3.50	4.75	
Chicago & N. W. (Peninsular Div.).....	23	5,787	43,354	43,382	97,323	42.22	1.78	1.04	0.56		7.09	10.47	3.50	4.75	
Chicago & N. W. (Indiana Div.).....	23	41,121	156,296	9,475	206,892	38.91	15.97	5.66	7.21	0.55	7.05	20.57	2.75	4.90	
Chicago & N. W. (Iowa Div.).....	101	74,997	172,207	33,847	281,051	35.67	14.01	3.96	7.29	0.59	7.27	18.68	2.75	4.90	
Cleve., Col., Cin. & Ind. (Ind. Div.).....	138	27,880	129,171	32,190	189,331	46.19	21.51	5.58	6.69	0.58	7.52	17.77	3.50	4.90	
Cleve., Col., Cin. & Ind. (Col. Div.).....	133	57,437	84,236	22,290	163,963	46.41	18.69	3.52	7.97	0.71	6.84	29.04	3.70	7.00	
Cleve., Col., Cin. & Ind. (Cin. Div.).....	130	26,415	26,927	21,531	69,873	43.24	23.40	3.23	5.14	0.52	8.23	17.42	2.35		
Cleveland & Pittsburgh.....	82	6,932	6,100	2,920	23,975	56.45	17.09	2.35	5.51	0.45	6.97	15.48	4.60	1.51	
Denver Pacific.....	16	11,021	26,205	11,007	48,321	33.75	6.96	12.07	0.74		7.99	27.68	3.50	4.90	
Illinois Central (Chicago Division).....	252.5	70	49,481	72,503	35,973	16,053	43.91	11.17	1.56	0.58	7.41	17.21	3.50	4.90	
Illinois Central (South Division).....	230.75	34	27,535	49,599	13,012	81,145	39.67	11.39	10.39	0.52	7.19	16.54	1.90	3.70	
Illinois Central (North Division).....	225	45	23,742	69,701	12,566	111,019	33.96	11.78	11.39	0.56	6.65	24.63	1.90	3.70	
Illinois Central (Iowa Division).....	401	39	27,536	58,344	15,475	101,655	34.29	11.78	11.39	0.56	6.65	24.63	1.90	3.70	
Kansas Pacific.....	703	39	27,536	58,344	15,475	101,655	34.29	11.78	11.39	0.56	6.65	24.63	1.90	3.70	
Lackawanna & Bloomsburg.....	80	25	12,610	25,315	21,885	61,810	47.58	22.53	5.61	0.70	7.43	24.50	3.71	11.41	
Lake Sh. & Mich. Sou. (Buffalo Div.).....	34	27,324	127,434	82,459	237,217	59.95	13.23	5.29	5.83		5.94	16.97	3.51	5.20	
Lake Sh. & Mich. Sou. (Erie Div.).....	97	43,569	167,927	67,079	274,565	53.30	41.40	20.52	5.34	0.65	7.18	19.17	3.51	4.90	
Lake Sh. & Mich. Sou. (Toledo Div.).....	74	41,447	139,255	41,233	223,935	53.27	49.49	19.33	4.92	0.76	7.58	20.16	4.10	4.90	
Leavenworth, Lawrence & Galveston.....	179	24,852	289,391	213,505	623,897	41.04	32.01	18.84	4.29	0.70	6.72	18.69	4.50	5.60	
Maine Central.....	68.5	11	7,417	8,475	23,003	39,654	67.58	22.53	2.49	6.12	0.57	7.19	16.54	3.70	
Marquette, Houghton & Ontonagon.....	72	21	6,512	13,475	27,304	47,291	102.80	24.61	11.51	0.51	0.99	8.96	29.90	7.50	2.03
Pennsylvania (New York Division).....	119.9	115	147,272	125,511	12,105	284,889	34.54	41.15	9.80	9.20	16.11	1.60		p. 10.	
Pennsylvania (Amboy Division).....	154	2	52,643	30,381	6,250	118,280	56.14	55.85	16.23		4.80	10.10	1.60	4.00	
Pennsylvania (Belvidere Division).....	84.6	38	21,552	41,036	13,048	75,636	49.40	44.64	12.75		3.80	14.21	1.60	4.00	
Pennsylvania (Philadelphia Div.).....	194.3	143	74,925	323,026	19,310	416,261	32.96	16.13	2.80	6.50	0.90	10.20	0.97	3.44	
Pennsylvania (Middle Division).....	131.5	131	63,004	307,812	13,242	394,438	29.31	23.32	5.40	7.10	0.50	13.30	0.97	3.44	
Pennsylvania (Pittsburg Div., E. End).....	79	10,270	169,990	6,542	186,800	25.39	11.14	4.50	8.10	1.30	13.70	0.61	0.97	3.44	
Pennsylvania (Pittsburg Div., W. End).....	125	75,545	215,117	15,723	304,383	35.09	14.54	6.29	6.20	0.50	11.30	0.61	0.97	3.44	
Pennsylvania (Tyrona Division).....	100.3	96	10,339	39,580	3,240	53,659	27.53	23.17	4.50	7.70	0.30	13.00	0.97	3.44	
Pennsylvania (West Penna Div.).....	103.6	32	17,226	59,026	3,440	70,492	35.11	24.04	7.90	5.90	0.60	14.40	0.97	3.44	
Pennsylvania (Leviatown Division).....	68.5	11	7,417	8,475	23,003	18,157	46.39	17.18	4.30	4.60	0.99	9.80	0.97	3.44	
Pennsylvania (Bedford Division).....	45	7	4,544	4,994	3,003	11,765	67.96	13.70	11.10	3.30	1.10	15.50	0.97	3.44	
Pittsburg, Ft. Wayne & Chic. (E. Div.).....	489.9	164	98,871	367,225	23,166	473,273	45.21	14.05	2.97	6.14	0.76	11.11	7.10	18.08	
Pittsburg, Ft. Wayne & Chic. (W. Div.).....	104	87,698	224,335	23,012	334,753	44.20	24.10	16.91	4.21	3.30	0.60	7.10	20.20	3.29	
Pitts., Cin. & St. L. (Mt. Miami Div.).....	42	50,107	47,391	3,100	100,598	47.70	11.70	4.10	7.20	0.90	7.90	12.50	2.50	3.50	
South Carolina.....	33	14,509	33,337	11,503	64,477	41.98	46.56	32.47	4.56	5.77	0.70	11.00	2.69		
Atlantic & Gt. W'n (First & Sec. Div.).....	223	80	45,422	115,473	26,942	197,837	41.98	12.23	5.13	8.67	0.80	8.84	3.42	3.81	
Atlantic & Gt. W'n (Third & Frch Div.).....	203	50	29,935	68,245	20,294	112,424	41.58	14.42	5.75	8.67	0.60	6.08	21.96	3.42	3.81
Atlantic & Gt. W'n (Mahoning Div.).....	113	54	18,919	53,337	57,225	129,961	41.50	15.93	4.38	8.67	0.55	0.46	6.26	20.80	

* Switching Engines allowed six miles per hour.

† 0.31 lbs. sand used per mile run.

at that point. This would require the construction of about 55 miles of road. When this line is constructed, it is proposed to build also from Belvidere northeast through Harvard to Elkhorn, Wis., 38 miles. The principal traffic southward is expected to be in lumber from Wisconsin and northward in coal from the mines about Streator. Considerable subscriptions have already been made to the stock.

St. Louis Railroad & Warehouse Company.

Articles of association for this company have been adopted and arrangements are being made to obtain subscriptions. The company's road is to extend from south end of the tunnel approach to the bridge by the shortest practicable route to the levee, and along the whole length of the levee in front of the city. The object is to connect the Missouri Pacific and Atlantic & Pacific depot with the levee, and the bridge. From the tunnel to the levee the road is to pass through the blocks, and the space on each side of the track is to be used for the erection of extensive warehouses. The company is to be organized under the general law, and will have a capital of \$3,000,000.

Pittsburgh, Washington & Baltimore.

The amount of the second mortgage bonds held by the city of Baltimore, on which the payment of interest has been deferred, is \$2,937,000. The company hopes to be able to pay this past-due interest in a short time. The city authorities have taken no action on the request of the company for indulgence, though a committee of the City Council is investigating the affairs of the company.

New York Central & Hudson River.

Work on the third and fourth tracks is progressing rapidly, and tracklaying is going on at several points. The rails are laid from Oneida to Canastota, 54 miles, and for three miles through Oriskany. The tracks are being ballasted as fast as laid.

St. Joseph Stock Yards.

The stock yards recently built at St. Joseph, Mo., have been leased to the firm of Denny & Redman of the Chicago Union Stock Yards.

Montpelier & Wells River.

A new locomotive and several cars have been received for this road, and trains have commenced to run from Montpelier, Vt., to Plainfield. The tracklaying will, it is expected, be completed in a few days.

Pequest & Walkill.

Meetings are being held along the line of this projected road, and an effort is being made to raise money by stock subscriptions. The road is to be an extension of the Warwick Branch of the Erie southwest to Belvidere, N. J. A large part of the line is nearly parallel to and not far from that of the New Jersey Midland's proposed Belvidere Branch.

Iron Valley & Pennsylvania Line.

Surveys have been made for this road under an act passed last winter by the West Virginia Legislature. The line surveyed extends from the Baltimore & Ohio road at the mouth of Raccoon Creek (near Tunnelton) north by east through Kingwood, crossing Cheat River near the mouth of Muddy Creek and past the London Iron Works, and then follows the valleys of several small streams to the Pennsylvania State line at the crossing of Big Sandy Creek. This line is 40 miles long and is to be extended by a Pennsylvania company 15 miles further to Ohio Pyle falls, on the Pittsburgh, Washington & Baltimore. The country passed through is rich in iron, coal and fire-clay, and is also thickly wooded.

Cairo, Arkansas & Texas.

This road is now completed, the last rail having been laid to Black River, opposite Poplar Bluff, September 18, and the bridge across that stream completed a few days later. Trains commenced to run over the road September 21. The road is 71 miles long, and extends from Greenfield's Landing, Mo., on the Mississippi, opposite Cairo, Ill., west by south to Poplar Bluff, on the Arkansas Branch of the St. Louis & Iron Mountain.

For some distance it follows the line of the old Cairo & Fulton